THE FOUNDRY

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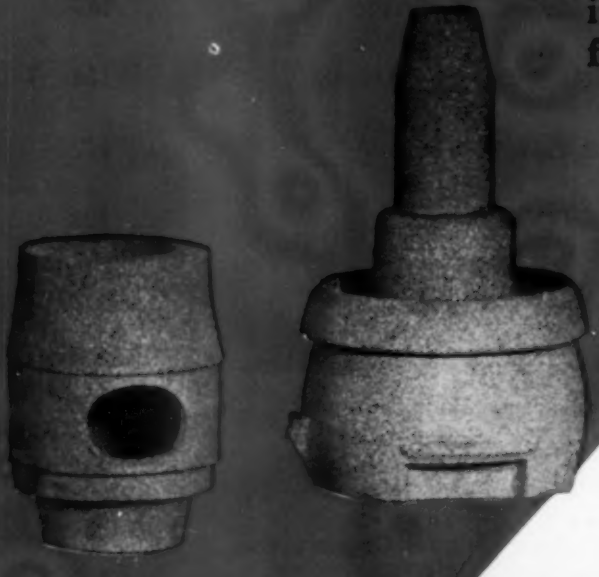
LINOIL IS STRONG . . .
UNIFORM *says user*

The Ohio Malleable Iron Company of Columbus, Ohio, has used a lot of Linoil and should be a pretty good judge of Linoil quality. "Your oil is very uniform and has given us quite a saving due to the strength it has shown," writes J. G. Garrard, President and General Manager. In this Mr. Garrard agrees with a great many other good foundrymen who know Linoil from long personal experience and use. Malleable iron, grey iron, steel, and non-ferrous metal founders in impressive numbers use Linoil and are perfectly willing to tell the rest of the trade that they find Linoil good.

LINOIL



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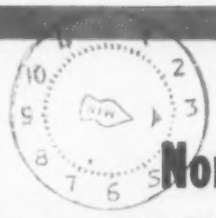

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Nonferrous Group Deserves Support

RECENT meetings of the Nonferrous Founders' Society in Chicago and Cleveland stressed importance of developments during the past four years in practice and products, and indicated the extent to which that industry contributed to war production. Although confronted with crippling shortages of both labor and critical strategic materials, manufacturers of copper base nonferrous castings increased production from a prewar level of 250,000 tons to 786,000 tons in 1944. During the emergency new facilities costing about $10,000,000 were built for specialized types of castings such as ship propellers. Production also was increased through mechanization of existing plants and improvements in practice.

In 1941 difficulties confronting the industry were multiplying rapidly. Government agencies failed to understand the tremendous need for brass and bronze castings, and shortages of copper and tin threatened to curtail production greatly. But brass and bronze foundrymen had production "know how," and were able to provide the military and maritime services with substitute nonferrous alloy castings which used less critical materials but served the purposes in an excellent manner. Further application of centrifugal casting and investment casting processes also permitted the nonferrous foundry industry to meet demands for highly specialized components. These and other technical developments undoubtedly will prove beneficial to foundries in meeting newer civilian demands.

Early in the war a number of farsighted nonferrous foundrymen realized the absolute necessity of co-operative effort in meeting problems created by government regulations. In 1943 these men formed the Nonferrous Founders' Society, and through their efforts and the assistance of many others who have come to see the importance to the industry of such an organization, the society has grown in numbers and influence. Today it has a membership of 370 and represents more than 50 per cent of the total tonnage of brass and bronze castings produced in the United States. Offices are maintained in both Washington and Chicago.

In the two years of its existence, the Nonferrous Founders' Society has served the industry well. In Washington it has guided the thinking of government agencies to the end that brass and bronze foundrymen were able to render maximum service to the war effort. Quite frequently the officers and staff found solutions to important problems before the difficulties ever confronted the entire industry. The society also has engaged in numerous other activities, including the development by its cost committee of a "Simplified Accounting Procedure and Cost Methods Manual." This manual has been made available to all nonferrous foundries and work now is under way to amplify and extend this cost information.

On the basis of service already rendered the industry, and in the face of situations which indicate even greater problems in the future than have been encountered in the past, the Nonferrous Founders' Society surely deserves the support, through membership, of every brass and bronze foundry in the country.

Frank G. Steinebach
Editor

Wartime Foundries of

CHINA

By E. K. SMITH
Consulting Metallurgist
Beverly Hills, Calif.

IN THE fall of 1944 things looked bad in what was left of Free China. Changsha had fallen, Kweilin had fallen, and the Burma road had long been closed. A hard Jap drive was headed towards Kweiyang, which is about half way between Kunming and Chungking, and the loss of which would have been a disaster. Even the position of Kunming did not look too good.

By almost superhuman efforts the Chinese had moved whole foundries, and even blast furnaces, many hundreds of miles, but most of their raw materials had been lost. Using trucks, sampans, carts, and strong backs, marvels of transportation had been accomplished, and iron and steel works set up in new locations. But the best sources of ore and coal were in the hands of the Japanese, and it was necessary to make the best of what could be found. Much valuable equipment had to be abandoned or destroyed.

One little incident will illustrate the discouragements that had to be met. The Japs were approaching rapidly, most of the equipment was on the road, and a manager pointed out to the men who were risking their lives some of the remaining items that would be desperately needed. Among these were a number of barrels of various ferroalloys, silicon, manganese, chrome, nickel, etc. Somewhere in the wild trip, the containers were lost, and when the manager prepared to start melting at the new plant, he found several tons of completely mixed ferroalloys! (At that, such a mixture could be used effectively in their converter steel.)

Get Boilers and Engines from Steamer

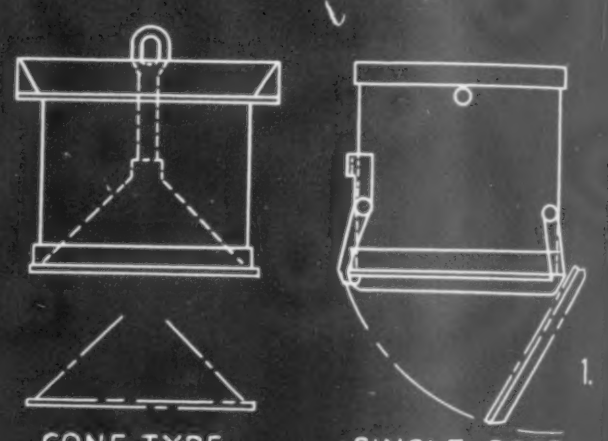
One foundry lacked power, so the workers dismantled a river steamer which had been bombed, moved boilers and engines to their plant, and soon had an excellent power plant in operation. And to top it all, a modern cupola was constructed from the ship's steel plates!

Moving the plants and getting them ready to operate was just the beginning. To make badly needed munitions, orders had to be placed by someone in high authority, raw materials had to be obtained, and finances arranged. To move a foundry hundreds of miles and set it up takes money, and just about that time inflation really showed what it can do. As the Chinese dollar became worth less and less, wages had to be raised so that the families could eat. This (*Please turn to page* 210)

Fig. 1—The author, shown at right, with Chinese foundry workers and cast land mines. Fig. 2—Slow and sure but does not like to be hurried. Fig. 3—Strong, energetic and cheerful workers of a Chinese foundry. Fig. 4—Clay mill of Chinese foundry. Most of the larger plants make their own refractories, often using buffalo-power to grind materials. Fig. 5—Cupola designed and built by Arsenal staff. General Fan, Arsenal director, at left. Fig. 6—Trench mortar shells made by permanent mold process. Fig. 7—Medium-size cupola with charging ladder on left. Note safety shoes and hat on worker at left. Fig. 8—Homemade parting compound made in empty land mine. Fig. 9—Burned-on sand presents problem in cleaning castings

What Type Charger and Charging Bucket?

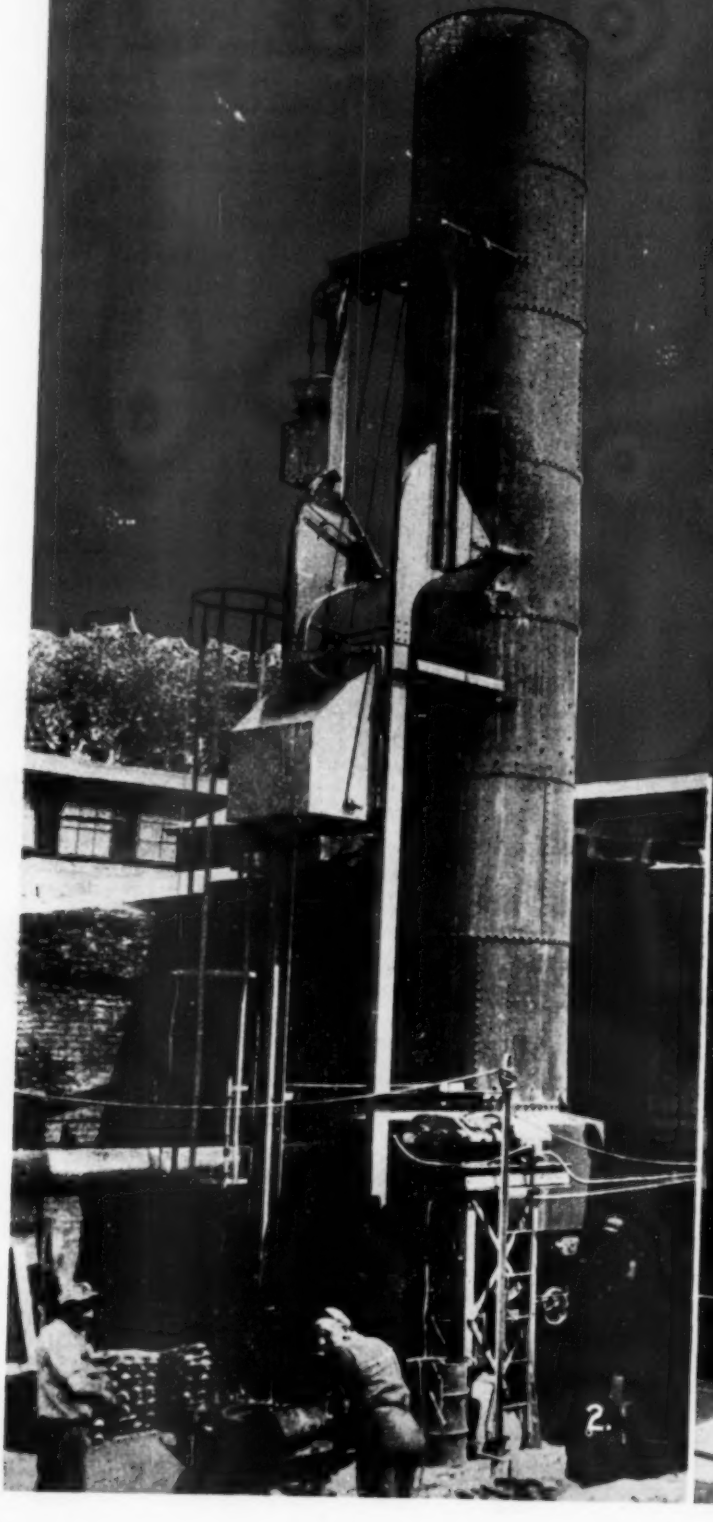
By A. W. GREGG
Executive Engineer
Whiting Corp., Harvey, Ill.



CONE TYPE CHARGING BUCKET

SINGLE-DOOR DROP BOTTOM CHARGING BUCKET

1.



2.

3.

NO one today wants the job of hand charging the cupola. It is a hard and disagreeable job in winter or summer, rain or shine, snow or hail, and the average working man today is not looking for that kind of a job.

This condition has brought mechanical charging very much to the fore, and some 40 per cent of our foundries, according to a recent survey, are considering the installation of mechanical charging equipment as a postwar project. During the war period practically all of the new foundries installed mechanical charging as part of the original plan.

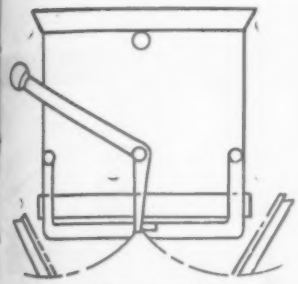
The old time foundryman believed that hand charging was the best and only sure way to properly distribute the stock in the cupola. This was probably true in the old days when men took some interest and pride in their work, and under such conditions a good job of charging the cupola could be accomplished.

Great improvements have been made in mechanical charging equipment and charging buckets during the past 15 years, especially in the last 5 years. Today there is a charger to fit any condition and any pocketbook, and it is only necessary to select the equipment best adapted to the conditions of the foundry in question.

No one type of charging equipment is best for all conditions, and the selection of proper equipment requires an engineering survey by a capable foundry engineer. The problem of charging the cupola must be studied from the arrival in the yard of cars of coke, scrap and the other materials of the charge. Every move and every handling of material should be accomplished mechanically if at all possible. With a complete mechanical charging system, it is possible to make up and charge from 20 to 50 tons per hour with a crew consisting of three and sometimes only two men.

Many factors must be considered before deciding upon the type of charging equipment to be employed, such as:

(a) Quality of product to be cast.
(b) Size of the cupola.
(c) Maximum tonnage and minimum tonnage per hour



TWO-DOOR
DROP BOTTOM
CHARGING BUCKET

Fig. 1—Illustrating operating principle of different type charging buckets

Fig. 2—Vertical skip hoist using over-the-lip discharge bucket

Fig. 3—Inclined skip hoist charger employing cone-bottom bucket

Fig. 4 — Horseshoe type charger serving one cupola by remote control

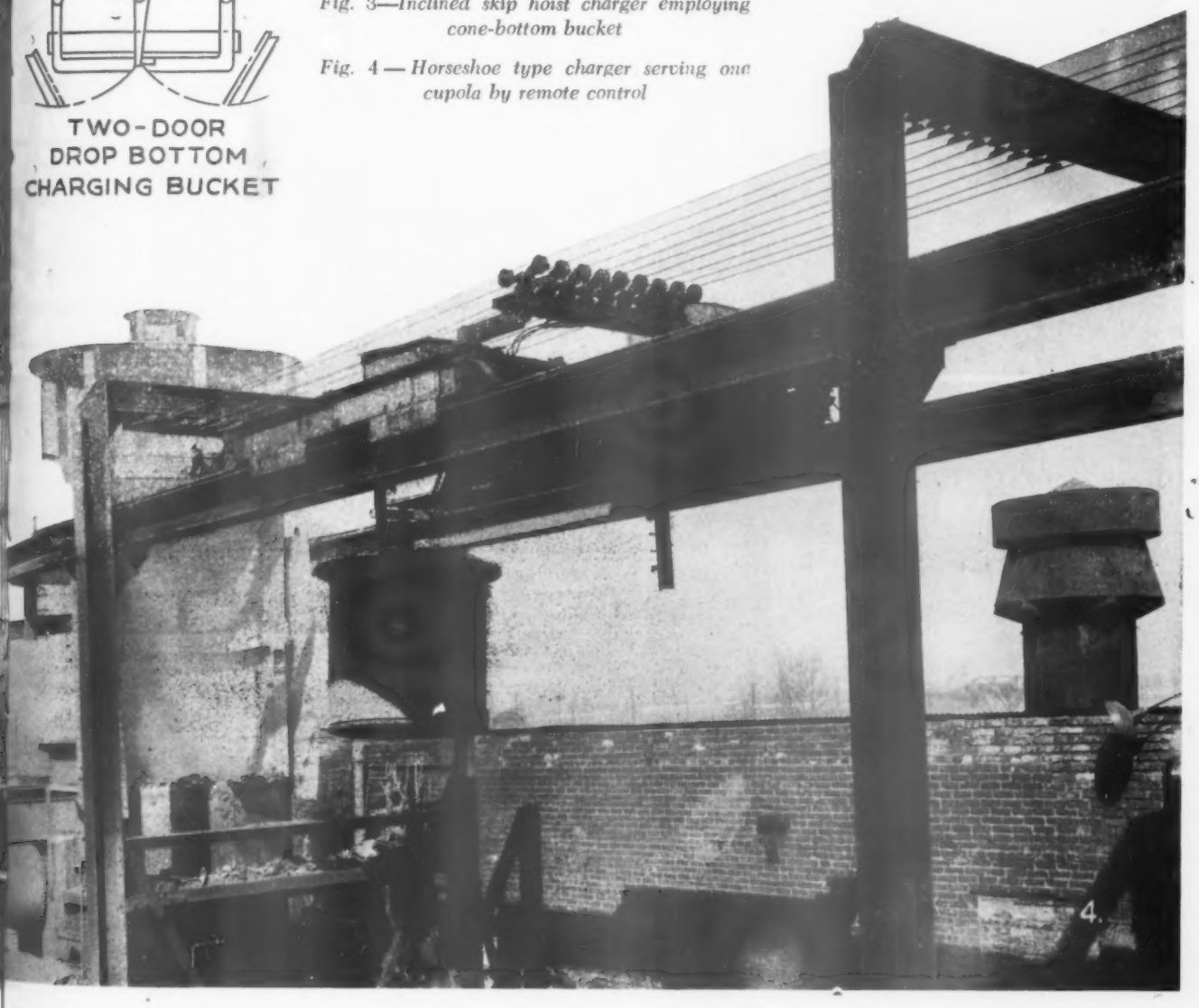


Fig. 5 — Underslung charging crane serving three cupolas. Loaded bucket shown just before being delivered to cupola

Fig. 6 — Another underslung crane. Serves two cupolas by remote control. Loaded bucket is about to be placed on wishbone for depositing charge

Fig. 7 — Overhead crane type charger serving two cupolas

and per day to be handled into the cupola.

(d) Number of hours the cupola is in operation.

(e) Size of the metal charge.

(f) Coke ratio.

(g) Density of the metallic charge.

(h) Largest pieces and kind of scrap used.

Consideration must be given to the number of men now employed, the method of unloading incoming material at present, the present method of delivering material from the yard to the charging floor and the amount of coke regularly kept in storage.

In addition to the foregoing, it is important to have the dimensions of the yard, the location of railroad tracks, all dimensions of the cupola and cupola building, and the current available for operating the crane and the charging equipment.

All types of present-day charging equipment will do a satisfactory job if properly adapted to conditions in the foundry under consideration.

The various types of cupola chargers may be classified as follows:

1. *Vertical Skip Hoist*: Employing (a) the over the lip-discharge bucket, (b) the cone-bottom discharge bucket or (c) the various types of bottom-drop-discharge bucket.

2. *Inclined Skip Hoist*: Employing any of the charging buckets listed under No. 1.

3. *Pivoting Type Skip Hoist*: To serve two or more cupolas. This equipment can be used with any of the charging buckets listed under No. 1.

4. *Griffin Type Skip Hoist Charger*: This is a heavy and rather special type of charger largely used in the car wheel foundries. This charger is an inclined elevator which tips through an angle of about 90° at the charging location. The charging car is loaded in the yard, pushed onto the platform of the skip hoist, and securely locked to the rails on the platform. Material is discharged over the lip of the tray on the charging car.

5. *Crane Type Chargers*: Crane type chargers include the following types:

(a) Horseshoe charger, which is a special trolley on a fixed runway serving only one cupola.

(b) The underslung type of charger, to serve two or more cupolas.

(c) The gantry crane type of charger, to serve two or more cupolas.

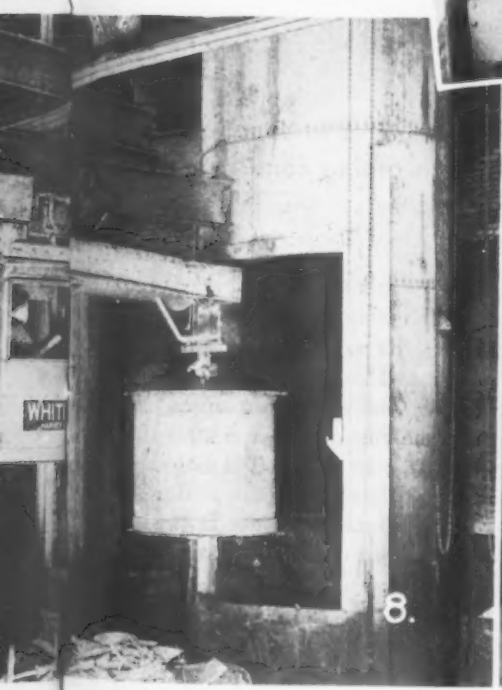
(d) Overhead crane type, serving as a rule only two cupolas.

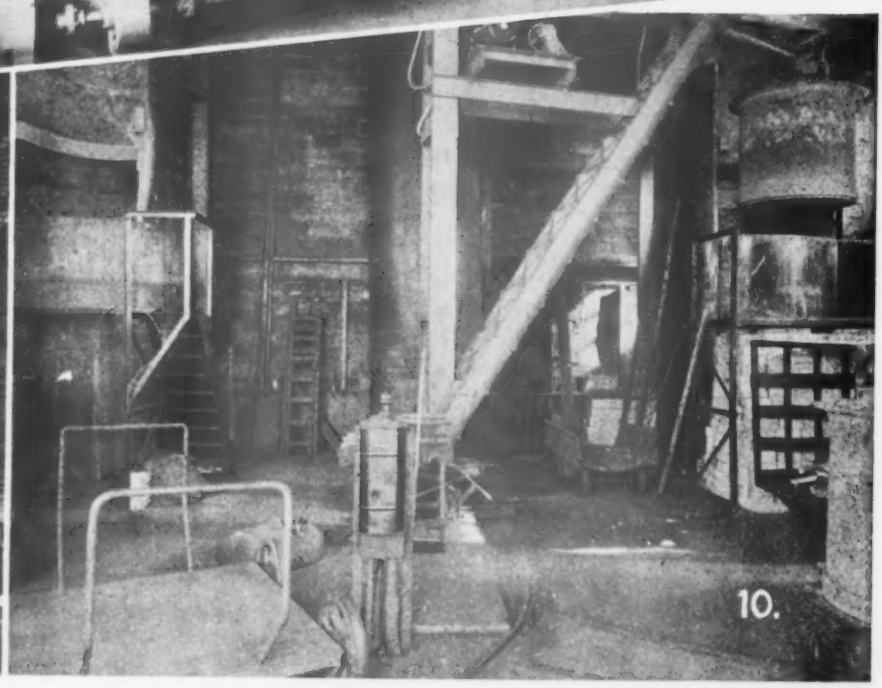
(e) Monorail crane type (*Please turn to page* 228)

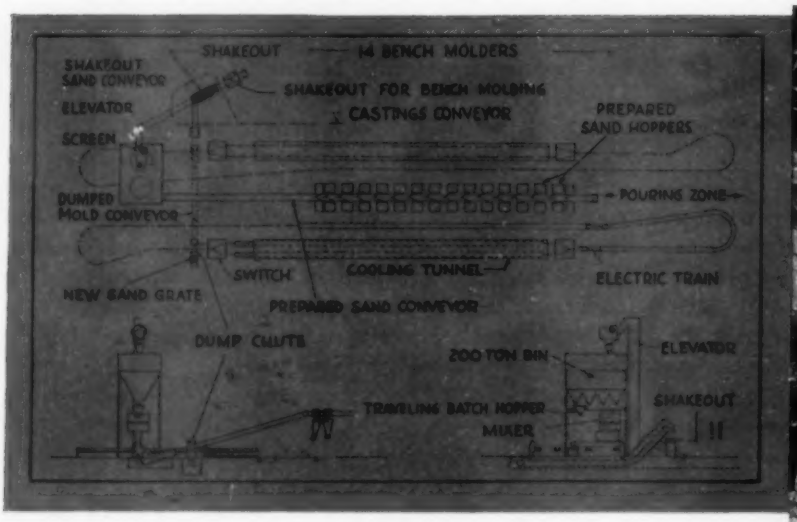
Fig. 8—Monorail charger with cone-bottom bucket. Serves two cupolas

Fig. 9 — Gantry type charging crane. Inclined boom gives sufficient room for cone-bottom bucket to pass in and out of the two cupolas

Fig. 10 — Jib crane charger can be swung around to serve either of two cupolas







Foundries of the Future

By MAJ. J. B. LAMENZO
United States Public Health Service
and
Connecticut State Department of Health

This is the second and concluding article discussing improvements in sand and mold handling facilities which point the way to better working conditions and more economical operations in foundries

A system employing a power-driven, intermittent mold conveyor with molds set on the conveyor by the molder, is illustrated in Fig. 11. The relationship between the conveyor and the molding station is such that the molder's movements in placing the molds on the conveyor are minimized. Pouring takes place in the pouring zone by means of a pouring monorail running beside and parallel to the mold conveyor. Two loops include 16 molders each, and four trains serve each loop.

After pouring, allowing a short time for cooling, the weights are taken off and placed on a rack from where they can be taken for use on the next trainload of molds. This foundry uses a heavier sand strip and supports molds by pushing them together, using end plates for end support during pouring. Popoff flasks are also used, and these molds are jacketed by the weight shifters before pouring. After removal of weights, the molds pass through a cooling tunnel which is hooded and exhausted.

Molds are dumped manually onto an apron conveyor which transports sand and castings to a central shakeout. Both the conveyor and shakeout are hooded and exhausted, and real job of dust control has been done at these points. The system operates on a 6-minute cycle at present, but the cycle can be changed to fit conditions. A system such as this assures more production at lower cost, providing continuous metal is available. At this foundry there is ample metal—full capacity will approach 180 tons in a 9-hour molding shift for the entire foundry. The section

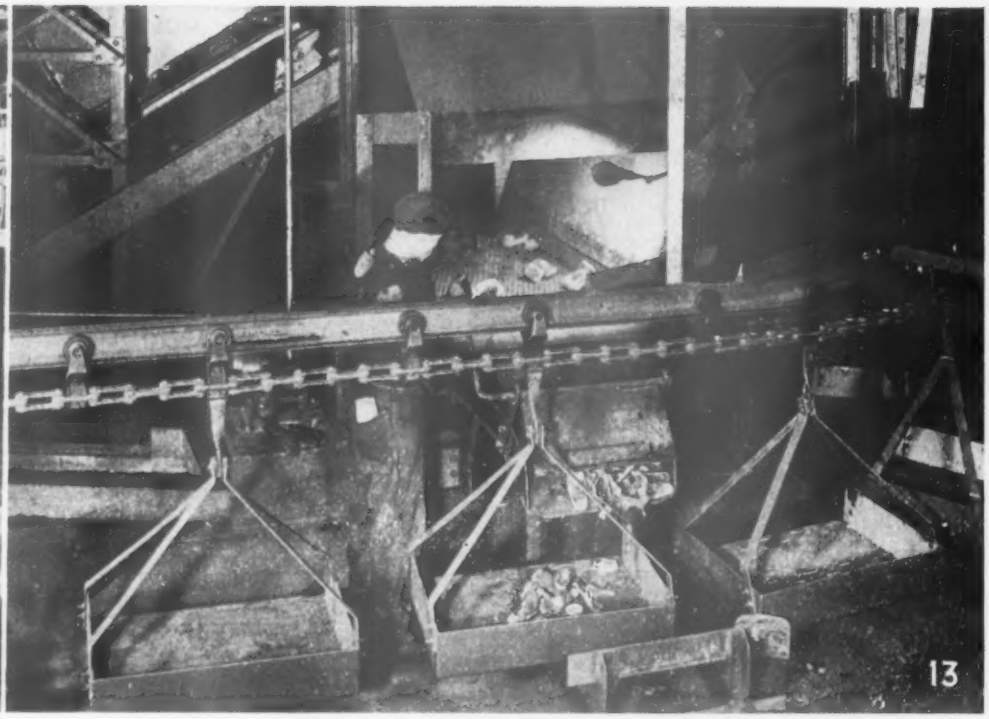


Fig. 11—System with power-driven, intermittent mold conveyor. Two loops include 16 molders each, with four trains serving each loop

Fig. 12—Conveyor at pouring zone. End plates support molds during pouring

Fig. 13—Castings are conveyed mechanically from shakeout to spruing station, the 45-minute trip providing time for adequate cooling

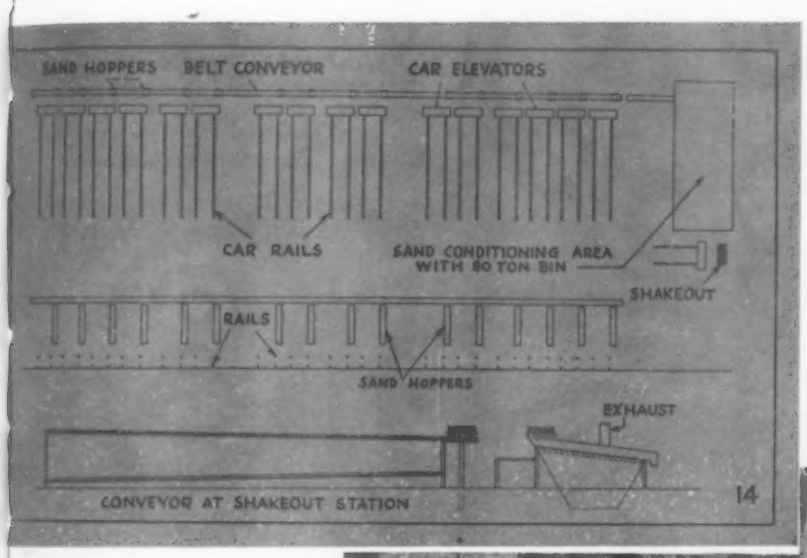


Fig. 14—Layout of first brass foundry in Connecticut to become mechanized. Molds are placed on cars which travel by gravity to pouring zone. Lower sketch shows arrangement at shakeout

Fig. 15—Lift truck used to convey poured molds to shakeout, also to return boards and flasks to conveyors serving molders

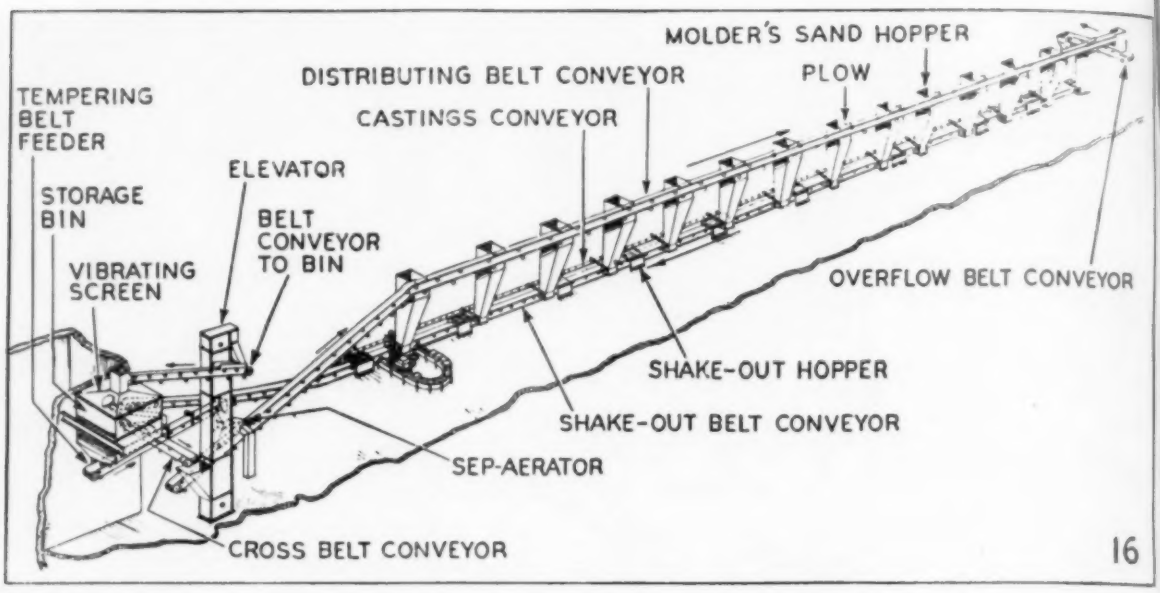
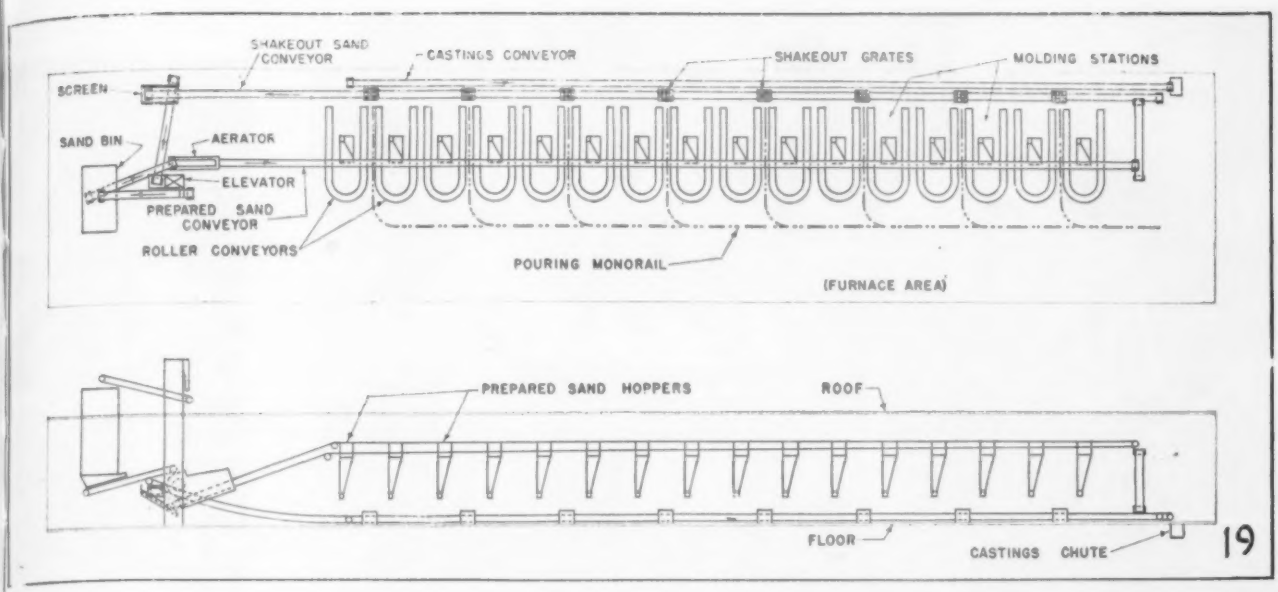


Fig. 16—*Showing compact a- rangement of a system serving 1 molders. Horseshoe-shaped co veyors are necessary because widt of room is only* 50 *ft*

Fig. 17—*View of general foundr floor before plant was mechaniz*

Fig. 18—*Same area as in Fig.* 1 *after mechanization*

Fig. 19—*Another view of th general layout shown in Fig.* 1



of the foundry served by the mold conveyor system will use 30 to 35 tons per day, when all 32 molders are operating.

The types of castings are similar despite the fact that frequent pattern changes are called for. Incidentally, half of the work is on matchplates and half as loose patterns on hard matches or follow boards. The superintendent advises that he figures 1 ton of metal per day per molder to pour the type of work they are doing, and the average of molds per molding shift is approximately 225 per molder. This is excellent production considering that 75 per cent of the work is cored. Present output is double the production under the old system. The cooling time is fixed and all castings must be ready for shakeout when that point is reached, otherwise they should be kept off this line.

Fig. 20—Setup of molding stations before mechanization. Contrast this with arrangement after mechanization, as shown in Fig. 21. Movements of molder in placing molds on conveyor are minimized. Conveyors are spaced 3 ft apart

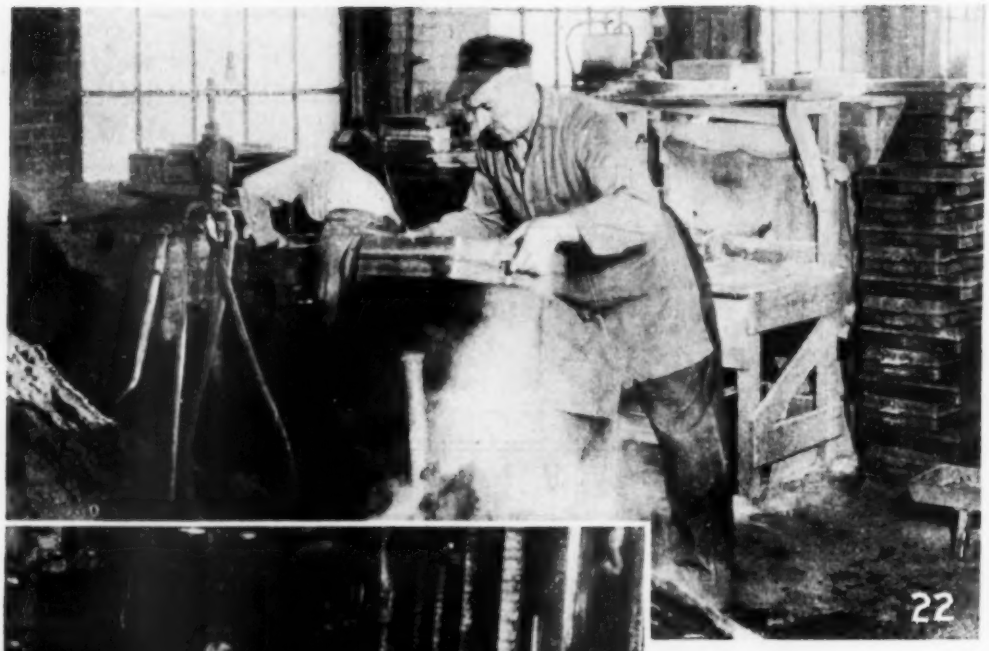


Fig. 22—Shakeout arrangement in foundry before mechanization shown in Fig. 16

Fig. 23—Improved shakeout system includes roller conveyor bridge to carry molds to shakeout where they are dumped onto the grating. Conveyor running alongside shakeout stations carries castings to floor below for sorting and pouring. Each of eight shakeouts serves two loops

This type of mold conveyor system is much less flexible than the gravity roll conveyor system and, as a rule, will not operate successfully in small jobbing or production shops. With the gravity roll conveyor system, the cooling time for different sizes and classes of castings can be easily arranged. And in the event of interruptions in the supply of molten metal, production is less severely handicapped than when a mold conveyor is used.

In planning continuous operations, it is essential to balance melting capacity and mold production, along with coreroom and cleaning room operations. As mentioned previously, a 2½ to 3 ton melt per hour is the minimum tonnage to be considered for continuous gray iron cupola operations.

This system requires one and one-quarter pourers and one weight shifter for five molders. These pourers transport their own metal from a central delivery point. However, the number of pourers can vary with the weight of iron in the molds. There is also one dump-out man for each loop of 16 molders.

The cost of this system was approximately $250,000. This cost includes the sand system and shakeout for the 14 bench molders operating adjacent to the conveyor unit.

It would be well to emphasize the indexing feature of this system:

1. Each molder always has his own car with his own follow or bottom boards.

2. The molder knows that he has ample space for the molds that he can make during each 6-minute cycle.

3. Molds requiring special pouring practice will always be in the same place in the pouring zone. This feature greatly assists the pourers.

Fig 12 shows the conveyor at the pouring zone. Note the method of supporting molds and the weight rack. Fig. 13 shows the hot casting conveyor. The castings are conveyed mechanically from shakeout to the spruing station, which is located next to the melting station. It takes 45 minutes for the castings to travel from the shakeout to the spruing station, and during this interval the castings cool sufficiently for handling.

Sand from a central shakeout is conveyed to a 125-ton

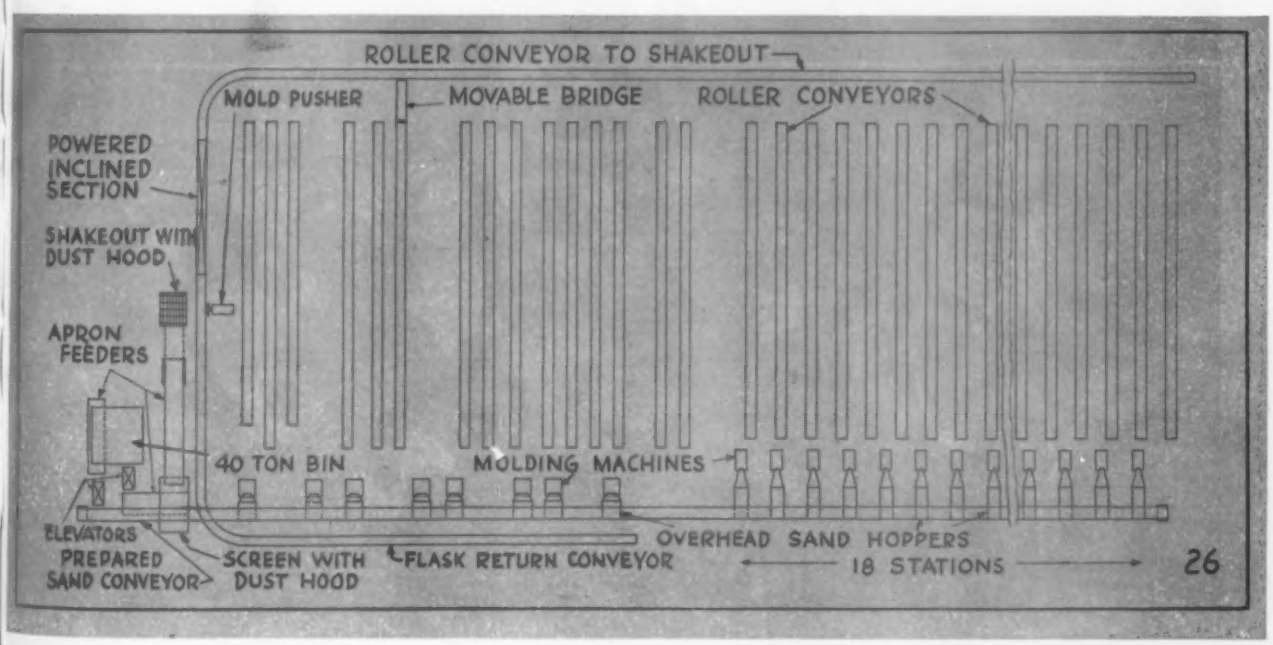
Figs. 24 and 25—Showing "before and after" views of metal handling. Work formerly done by three men with hand ladles now is accomplished by two men with assistance of monorail conveyor and pouring devices

Fig. 26—Layout of mechanized gray iron jobbing shop making castings up to 200 lb, with peak pouring capacity of 50 tons daily

storage bin. Two mixers, with a capacity of 50 tons per hour each serve the molders on the conveyor line as well as the bench molders.

Fig. 14 illustrates the first brass foundry in Connecticut to become mechanized. The installation was completed in 1932 at the unusually low cost of $30,000 to $35,000 for 16 molding stations. This cost included the cost of the lift truck used to transport the molds.

The system is unusual. Each molding station abuts a conveyor that operates in the manner shown in the detail section of the drawing. The cars reach the elevator by gravity. The molder, by (*Please turn to page* 258)



GRAY IRON

Hold Peacetime Production Conference

By WILLIAM G. GUDE
Associate Editor
THE FOUNDRY

Record attendance and an excellent program of papers marked the Peacetime Production Conference and 17th annual convention of the Gray Iron Founders' Society at the LaSalle Hotel, Chicago, Oct. 23-24. Many of the problems discussed concerned the difficulties facing the industry today in its efforts to increase the production needed to accelerate nationwide reconversion, although a number of subjects had significance with respect to the long-term prospects of gray iron foundries. Registration for the two-day meeting totaled 279, largest in the organization's history.

In the president's annual address, Walter L. Seelbach, Forest City Foundries Co., Cleveland, stressed the need for a realistic policy on the part of government agencies associated with the reconversion program, not only in the matter of labor but also in connection with prices. He read a letter from John D. Small, chief of staff, War Production Board, in which the latter advised the WPB had recommended an intensification of referrals to foundries by the United States Employment Service. A communication from John W. Snyder, director, Office of War Mobilization and Reconversion, stated that a special group of representatives of government agencies concerned with reconversion had been appointed to take all possible steps to alleviate the threatened shortage in gray iron castings. Mr. Seelbach pointed out that inasmuch as the reconversion pace must be adjusted to that of casting production, the gray iron foundry industry should be represented in steps taken to speed the revival in postwar manufacturing as a whole.

Addressing one of the luncheon sessions, Senator Alexander Wiley of Wisconsin described administrative failures of the government, insufficient manpower, strikes, and "synthetic and loose-minded thinking" as the principal

Scenes at recent annual convention of Gray Iron Founders' Society. Shown at microphone in top row, left to right, are: L. V. Wickson, Almont Mfg. Co., Imlay City, Mich.; E. M. Cushing, United States Rubber Co., New York; Lt. Col. John Lansdale Jr. Below, H. C. Nicholas, Quality Castings Co., Orrville, O., addressing the conference

bottlenecks preventing the foundry and others from quickly and efficiently returning to adequate peacetime production. Text of Senator Wiley's remarks starts on page 97 of this issue.

At a meeting of the board of directors after adjournment of the convention, H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J., was elected to succeed Mr. Seelbach as president of the society. Other officers elected include: Vice president George H. Alten, owner, Alten's Foundry & Machine Works, Lancaster, O.; secretary, Howard A. Stockwell, treasurer, Barbour Stockwell Co., Cambridge, Mass.; treasurer, Homer Britton, vice president, Cleveland Foundry Co., Cleveland. (See page 135 for biographical sketches of the new officers and directors).

Discussing "Gray Iron Foundry Progress Through Research," Howard F. Taylor, Naval Research Laboratory, Washington stated that future demand for improvement in manufactured articles will necessitate a quality in castings presently unknown to most foundrymen. "Optimum surface excellence, dimensional accuracy, internal soundness and greater strength and ductility will be required of iron castings," he declared. "More accurate information on the properties of castings will be needed by design engineers if they are to be expected to use gray iron castings in their products. Competition from steel and nonferrous castings will be acute, and the age-old battle with forgings and weldments will increase in intensity. What this all means to a gray iron industry of prominence is *research*—research on a big scale, well co-ordinated, properly directly and vigorously prosecuted, unless the industry is willing to relegate itself to building bigger and better bath tubs."

Mr. Taylor reported that the Navy is getting under way on a comprehensive research program in gray iron, duplicating in that metal the broad fundamental work conducted the past 17 years in steel castings. The purpose is to ascertain facts on which suppliers of gray iron castings for naval use can base their designs. The Technical Committee of the Gray Iron Founders' Society is co-operating with the Naval Research Laboratory in developing the program.

In speaking of the various fields in which opportunities for valuable research exist, Mr. Taylor pointed out that graphitization, chill characteristics, segregation, and control of microstructure have all been studied by competent metallurgists, but much more remains to be done. The principles and control of inoculation, heat treatment, and sand practices also offer possibilities of effecting improved practices through research, he added.

E. L. Roth, Motor Castings Co., Milwaukee, and chairman of the society's Technical Committee, announced the establishment of a 2-year fellowship at the Massachusetts Institute of Technology, to be devoted to the study of subjects related to gray iron, and to be filled by Mr. Taylor.

Sound cost practice was discussed in papers by H. C. Nicholas, Quality Castings Co., Orrville, O.; L. V. Wickson, Almont Mfg. Co., Imlay (*Please turn to page* 136)

President Walter L. Seelbach presents the Gray Iron Founders' Society awards for distinguished service to government and the industry. Recipients, shown top to bottom, left: E. P. Buchanan, Pittsburgh Coke & Iron Co., Pittsburgh; William Kerber, Hanna Furnace Corp., Buffalo F. G. Steinebach, THE FOUNDRY. *Right, D. J. Reese, International Nickel Co., New York; E. C. Hoenicke, Eaton Mfg. Co., Detroit; A. D. Hannah, War Production Board*

Some Bottlenecks of Reconversion

By HON. ALEXANDER WILEY
United States Senator from Wisconsin

This discussion of circumstances impeding more rapid acceleration in production by the foundry and other industries is from a talk given before the recent annual convention of the Gray Iron Founders' Society in Chicago

IT IS unnecessary to tell you the problems of your industry, which are not only grave and crucial to you, but to the nation as a whole. I have watched with concern the failure of some of our government officials to understand the importance of the foundry industry in meeting the reconversion needs of this nation, and in providing jobs for the nation. The government is proving a bottleneck on this score.

To take the various bottlenecks in order, let's consider the bottleneck in the gray iron foundry industry first. I believe I have covered that in a recent letter to John Snyder, director of the Office of War Mobilization and Reconversion. It is as follows:

"There has recently been called to my attention a very serious situation in the gray iron foundry industry.

"I am informed that if this situation is cleared up —if 68,000 to 70,000 men can be secured for this industry—it will mean that as a result of what they produce, jobs for 3 or more million men in industries which use the gray iron castings will be created.

"I will be specific in this matter. The automobile industry, as you know, is in dire need of gray iron castings for motor blocks and heads. The refrigeration and air-conditioning industries require castings for motor compressors and heads, motor end frames, cylinders, and rings; the washing machine industry for frames, arms, motor end frames; the textile industry for repair parts for looms, weaving machines; and all types of textile machinery; the rubber industry for tire molds and repair parts for the rubbermaking machinery; the mining industry for coal mining machinery; the railroads for brake shoes and car wheels. Other industries need these vital items for farm machinery; for food processing machinery; for office equipment, etc.

"I have recently listened to talks over the radio and seen press releases in relation to shortages, but all of these seem to have missed the vital point that none of these shortages can be met without the prior production of g.ay iron castings.

"As you know, much of the machinery that we are relying upon for reconversion has been worn out and the need for new parts (casting) in all the lines suggested above, is so critical that I feel that I am doing the proper thing in calling your attention to this fact, which you undoubtedly know, but because of pressure of business and other matters may have overlooked.

"Now, anyone who makes a suggestion should have a remedy.

"If the government is really interested (as I think it is) in getting reconversion under full steam, then the government must look after 'first things first.' That means getting 70,000 workers into the gray iron foundry industry — 70,000 jobs there are looking for men. What is the government doing about filling those jobs? I am sure it is not disputed that these jobs will produce 3 million other jobs. Is there anything more important in America than the matter of creation of jobs—the very thing about which I am writing you? If there is, I don't know it. On other occasions the government has taken steps to get men to fill critical situations. I think that is what must be done now.

"Will you kindly let me hear from you in the immediate future in relation to what is intended to be done and what is done on this matter."

I have already spoken in the Senate and introduced this letter into the record. On that occasion I said:

"It was not so long ago that we heard talk about bottlenecks in the production of materials for war. The situation has now changed. We are no longer producing for war, but we face bottlenecks in reconversion which will interfere with our economic prosperity unless we 'bust' them wide open.

"I especially stress the importance of this matter (the gray iron founders' problem) to the chairmen of the two committees I have mentioned. Without any reflection upon any individual or committee, I wish to say that failure to take action in this matter will not only clog the channels of employment, but will demonstrate an utter lack of perspective.

"There is another phase to this matter. There are some ugly rumors going around. They are to the effect that there are those in government, and those in labor, who don't want reconversion to run along smoothly and get under way at a maximum pace. I pass no judgment on such rumors, but I do say that there is a lot of dumbness in high places.

"I said the other day that the public interest was paramount to any individual (*Please turn to page* 244)

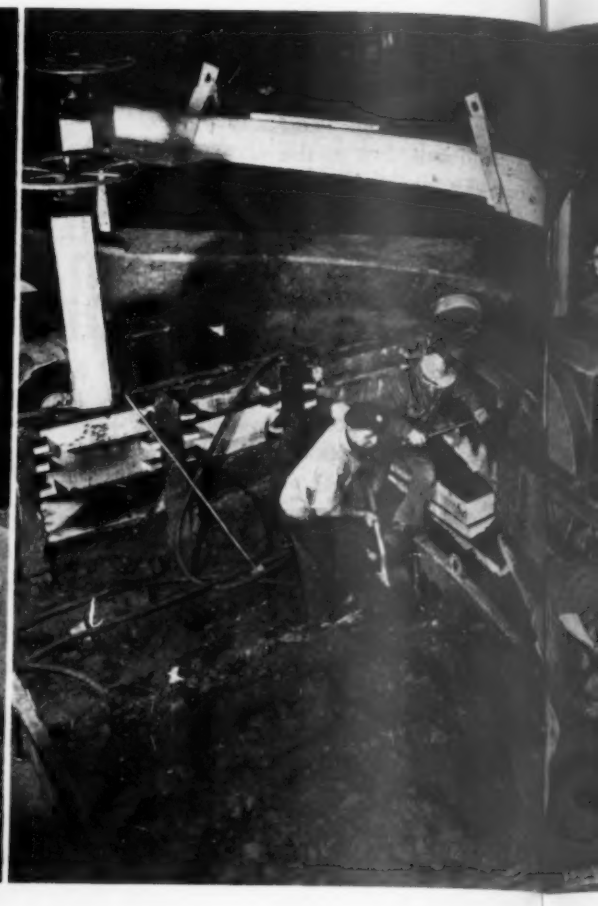


Fig. 1—Electric melting furnace with maximum practical capacity of 22 tons used by Columbia Steel Casting Co., Portland, Oreg. Unit is charged from top after lifting off roof by overhead crane

Fig. 2—Showing method of molding green sand drag for cast center section of Swan Island tanker. All of the ship castings were poured in green sand molds

Fig. 3—Largest electric furnace in the United States used solely for producing steel for castings. This 25-ton furnace uses 17-in. electrodes in 5-ft sections at rate of 12.2 lb per ton of charge

Fig. 4—Finishing drag face of mold for tanker center section casting

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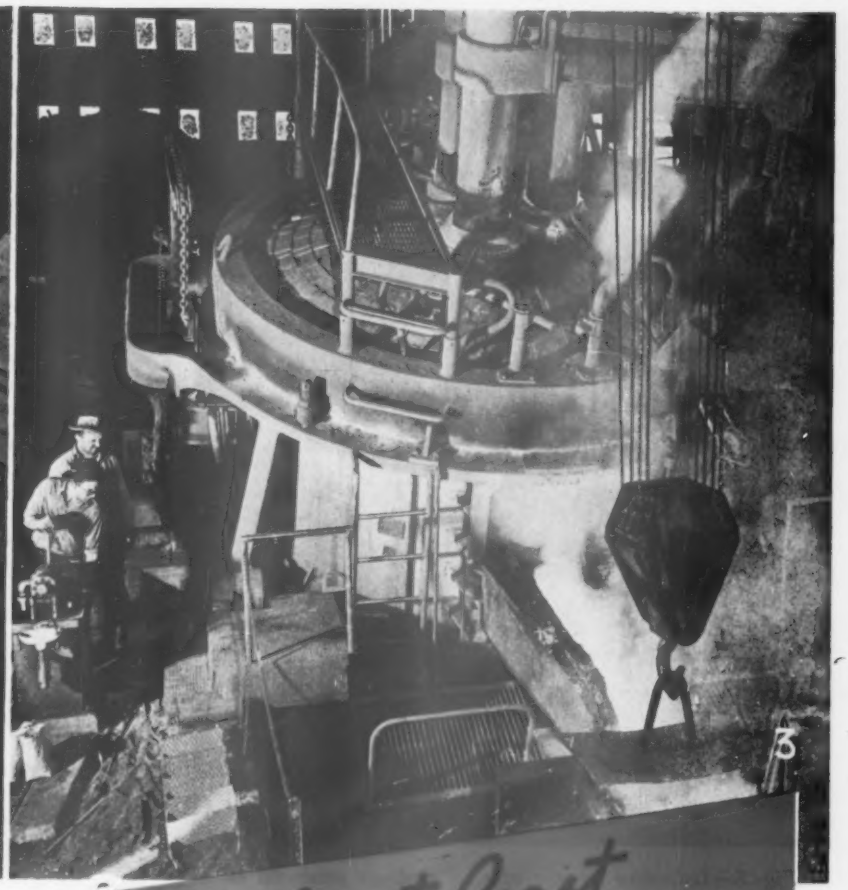

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West Coast Steel Foundry Uses Large Furnaces

By RAYMOND L. COLLIER
Executive Secretary
Steel Founders' Society of America
Cleveland

AFTER the United States went to war the shipbuilding industry was expanded enormously. New yards were built and existing ones greatly enlarged. Nowhere was this expansion greater than on the West coast.

When the war started there was no steel foundry in the Pacific Northwest capable of producing large marine castings such as stems, struts, stem frames, etc. To supply this demand the Defense Plant Corp. spent more than a million dollars to provide steel foundry facilities operated by Columbia Steel Casting Co., Portland, Oreg., representing an increase of about 1000 net tons of castings capacity per month.

Two large electric melting furnaces were installed. One with a maximum practical capacity of 22 tons has a 12-ft shell. The transformers were built by the local electrician from three scrap cases of 1500 kw each, and have given excellent service. This furnace is charged from the top after simply lifting off the roof by an overhead crane. It functions well on charges as small as 10 tons. Twelve-inch electrodes in 5-ft sections are used, electrode consumption being about 6½ lb per ton of charge. Electrical energy consumed runs about 485 kwh per ton of charge. The melting cycle—from tap to tap—is 7 hours.

The other furnace, a 25-ton unit, is the largest electric furnace in the United States used solely for producing steel for castings. (See Fig. 3.) It uses 17-in. electrodes in 5-ft sections. It uses 12.2 lb of electrodes per ton of charge, the energy input being about the same as for the 22-ton furnace. It has 10,000-kva transformers from which current of about 7500 kw is obtainable, sufficient to melt about 15 tons of charge per hour.

Fig. 5—Indicative of size of steel castings produced at this foundry, here is the stern frame center section piece for a tanker. Most of the ship castings produced weighed 20,000 to 42,000 lb each

A normal heat in this furnace is 65,000 lb. Heats from 60,000 to 90,000 lb represented the average range, the maximum being slightly over 50 tons. It is a standard top charge furnace with a swing roof. A magnet is used for charging instead of the usual bucket.

Both furnaces are acid lined. Average analysis of steel poured is: 0.70 Mn, 0.21 to 0.24 C, and 0.40 Si.

For the most part mild steel plate scrap from the shipyards is charged in to the furnace.

Mechanical properties average:

Tensile strength, 60,000 to 70,000 psi.
Elongation, 25 to 35 per cent.
Reduction of area, 35 to 58 per cent.

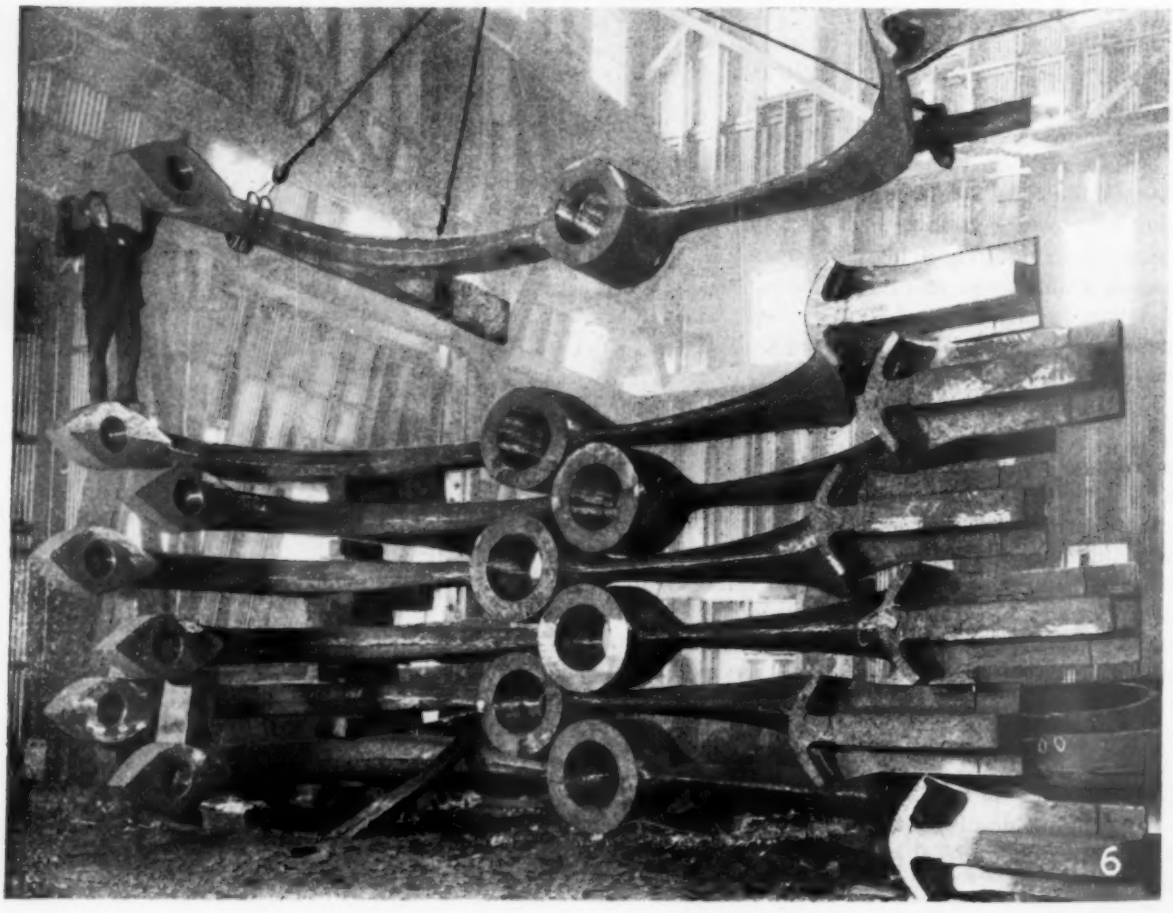
Most of the castings, all of which are poured in green sand molds, weigh from 20,000 to 42,000 lb each and require 25,000 to 70,000 lb of liquid steel per casting.

Four-bladed Victory propellers, each requiring nearly 70,000 lb of liquid steel, were poured in green sand molds. Typical castings are shown in the accompanying photographs.

At the peak of wartime demand as many as 36 Liberty stern frames, such as shown in Fig. 6, were produced per month—more than one a day. Each stern frame weighs 31,000 lb.

Asked how a foundry experienced in producing relatively small castings could successfully produce these very large castings, Hobart M. Bird, general manager of Columbia Steel Casting Co., made this significant statement: "We just treated big castings as we did small ones and got away with it!"

Fig. 6—Stern frames for Liberty ships, each weighing 31,000 lb. At the peak of wartime demand as many as 36 of these stern frames were produced monthly



AFA Makes Plans For 50th ANNUAL MEETING

PLANS for the Golden Anniversary Foundry Congress and Foundry Show of the American Foundrymen's Association, to be held in Cleveland, May 6 to 10, are well under way, according to announcement by association headquarters in Chicago, with the goal "the most important convention and exhibit ever staged by and for the foundry industry."

All signs point to a realization of this ambitious program, with all facilities of the Cleveland Auditorium contracted for and program details being worked out steadily. A huge attendance is expected, perhaps the largest in history. Among the reasons for such an attendance are the cancellation of the 1945 convention, international participation in 1946, revived sales activities of many equipment and supply firms, and the celebration by the association of its 50th year of service as a technical society of the foundry industry.

Throughout the entire week, the emphasis will be on problems of reconversion and production for peacetime industry, as the conventions of the past four years have concentrated on war production methods. Efficiency, lower costs, quality control and, above all, means of increasing casting production, will occupy the attention of foundrymen and exhibitors alike.

Numerous meetings have been held by committees of the association during the past weeks for organizing the program of technical and practical sessions. Comprehensive schedules have been worked out by the Gray Iron, Steel, Patternmaking, and Malleable Divisions of AFA. Other meetings are scheduled for the Brass and Bronze, and the Aluminum and Magnesium Divisions.

Each of the divisions will conduct a full complement of sessions dealing with many phases of foundry practice and metallurgy. Several roundtable meetings again will be presented, as well as the popular shop operation courses and the annual lecture course. Programs also are being formulated by committees on foundry costs, inspection, castings defects, specifications, foundry sand research, apprentice and foreman training, refractories, plant equipment, safety and hygiene, job evaluation and time study, and other phases of modern castings production.

It also is contemplated to have special meetings for engineering school instructors, chapter delegates, Canadian delegates, and groups working closely with AFA on its long-range educational program.

The demand for exhibit space at the 1946 Foundry Show already is fulfilling optimistic predictions. Scores of firms that have withheld exhibiting during the war years are once more planning displays of equipment, materials and supplies in Cleveland, in keeping with their enlarged postwar selling plans. Many companies are planning to bring their sales representatives from various cities, in numerous cases newly employed veterans from the armed services, to give them a background for their work.

It is known that much new and improved equipment will be available for display, especially in the way of sand control, materials handling devices, casting cleaning, dust control, melting, and molding methods. Efforts are being directed toward operating displays depicting equipment for centrifugal casting, precision casting, permanent molding and other foundry processes which have come to the fore in recent years.

Announcement is made that the Foundry Show will be a fully operating exhibit, the Cleveland Auditorium being completely equipped for any operating loads expected. The value of seeing equipment in actual use undoubtedly will be fully realized by foundry management in sending key men to study the latest methods available for cast metals production and control.

Hotel accommodations for the Cleveland convention will be assigned through an experienced housing bureau, it has been announced, so as to provide a maximum number of rooms for both exhibitors and foundrymen. Cleveland hotels have agreed to co-operate fully, and all requests for rooms during the convention are being referred to the official AFA Housing Bureau, 1604 Terminal Tower, Cleveland 13.

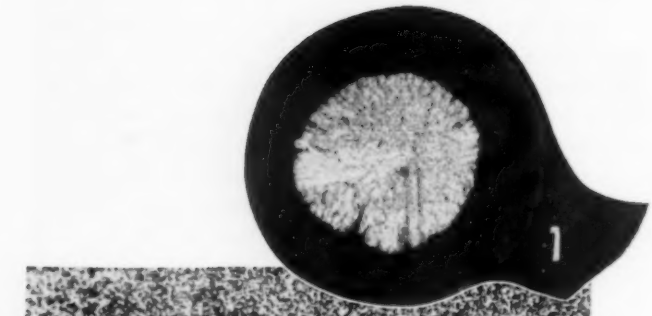
The association will mail out hotel application forms about Jan. 1, simultaneously to all AFA members, exhibitors of record, and others interested in the event. Applications may also be obtained after Jan. 1 from the Cleveland Housing Bureau. Assignment of rooms will commence about Feb. 15.

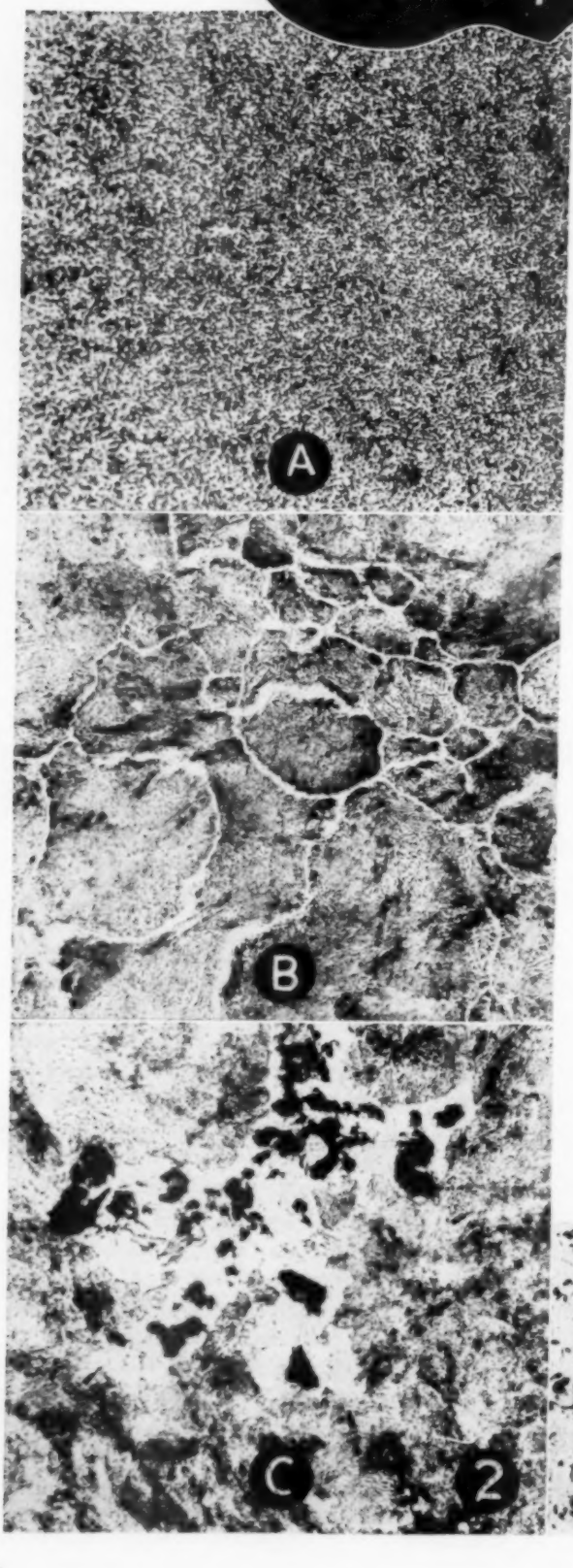
In order to provide rooms for a maximum attendance, the convention management has requested each individual company planning to send representatives to apply for only such rooms as are necessary to accommodate its own men, and to double up whenever possible. While military demands on hotels undoubtedly will be eased during the next four months, it is realized that commercial travel is again on the increase, and that a sellout of hotel space for the convention week undoubtedly will occur.

Committees on convention arrangements are being formed by the Northeastern Ohio Chapter under the general chairmanship of Chapter President A. C. Denison, Fulton Foundry & Machine Co., Cleveland. The general committee heading up all local arrangements includes, in addition to Chairman Denison, General Vice-Chairman H. J. Trenkamp, Ohio Foundry Co.; General Secretary Gilbert J. Nock, Nock Fire Brick Co., and General Treasurer F. Ray Fleig, Smith Facing & Supply Co.

Committees now are being formed, to be announced later, for ladies entertainment, (*Please turn to Page* 142)

OPINIONS





THE SUBJECT, graphitization in commercial iron-carbon alloys, is complex because of the many things, some of them scarcely suspected, having a direct or indirect influence on the reaction $Fe_3C \rightleftarrows 3Fe + C$. When one considers the many influences at work in materials of this type it is understandable that many aggravating abnormalities occur in everyday practice.

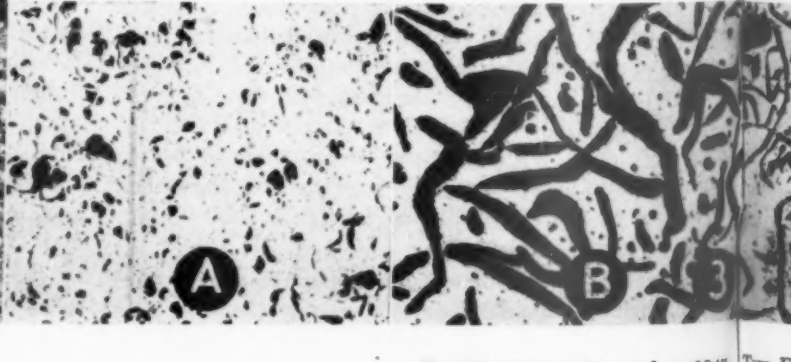
Consideration usually is given to five elements plus any additional alloys and inoculants that might be used. However, many another element may be, and usually is, present. Furthermore, the amounts and forms of these may vary from charge to charge. Their end results may even vary with the environment during the metallurgical operations, both melting and subsequent heat treating. The effects of "minor constituents" are, in a great many cases, by no means minor. The magnitude of the effects of some of these, under certain conditions, is far beyond anything that would be suspected from the minute amounts present. Their influence may vary with the composition of the base material and with the lesser amounts of other elements present either intentionally or unintentionally. Minute amounts of some elements may greatly intensify or diminish the influence of another.

Other influences are environment and thermal treatment. Environment includes atmosphere, furnace and ladle lin-

Fig. 1—Internal cracks resulting from severe quenching. Surrounding black portion is sound part fractured after graphitization

Fig. 2—High carbon steel after various malleablizing cycles (etch picral, mag. 100X). A: As received; B: Through malleablizing cycle three times, packed in carburizing compound; C: Through malleablizing cycle 15 times, packed in carburizing compound

Fig. 3—Soft gray iron bars ½-in. diameter (unetched, mag. 100X). A: Cast in ordinary molding sand; B: Cast in hot insulating brick



Graphitization

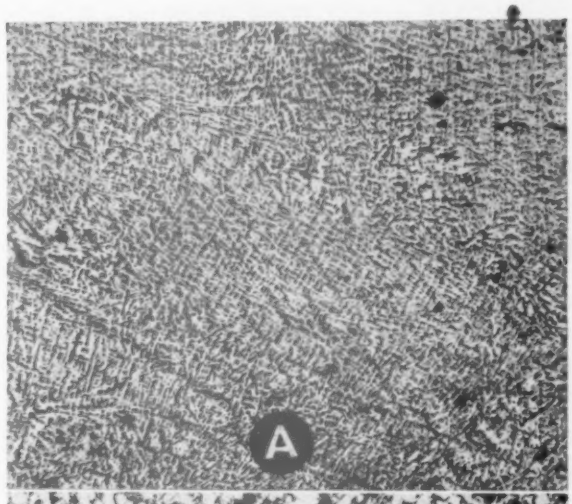
By LESTER CROME
Director of Research
Dayton Malleable Iron Co.
Dayton, O.

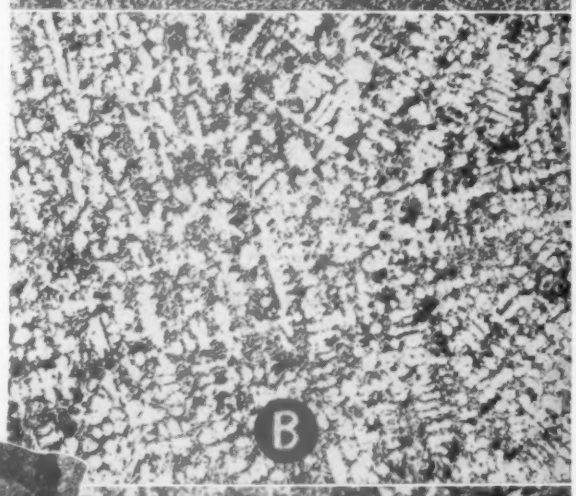
ings, slag, mold surface, etc., in fact, anything that comes in contact with the metal at elevated temperatures. Thermal treatment includes history in the melting unit, time and temperature loss to pouring, pouring temperature, cooling in the mold through solidification on down to atmospheric temperature and any subsequent heat treatment. Cooling in the mold is not simply an extraction of heat. In some cases it amounts to a potent heat treatment.

Many of the factors are interrelated, and a change in one may produce unexpected results because its direct influence on graphitization is less than one brought about indirectly through its influence on some other factor.

The results of additions to the molten metal, either in furnace or ladle, in many cases are dependent on the temperature and the time elapsing between the addition and pouring.

One of the most powerful of all graphitizing influences is free carbon, in the proper form. The various types of carbon particles encountered in (*Please turn to Page* 248)





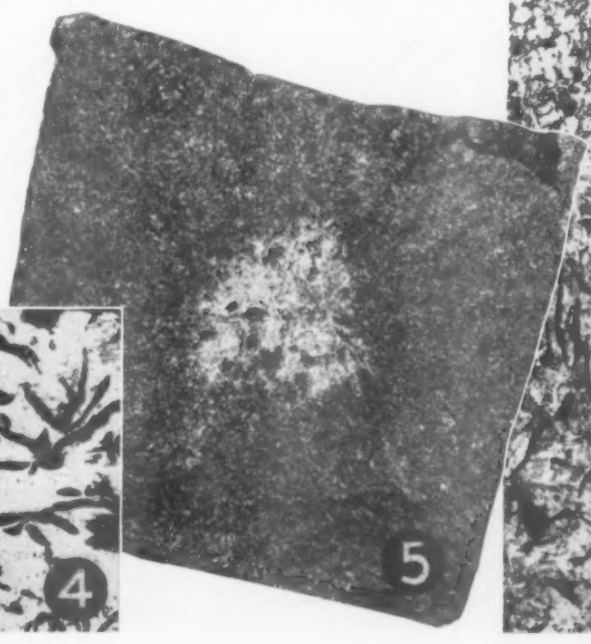


Fig. 4—Same iron as shown in Fig. 6 but cast in form of 5-in. cube. Slow cooling produced large graphite flakes and decomposed all but traces of pearlite. (Etch nital, mag. 100X)

Fig. 5—Iron mixture containing 1 per cent Cr with trace of tellurium. Fracture is fairly dark gray with bright white "chill" in center

Fig. 6—Soft gray iron test wedge (etch nital, mag. 100X). A: Chilled tip—practically all carbides; B: Area adjacent to chill showing fine graphite and ferrite; C: Heavy end of wedge — flake graphite, pearlite and ferrite

FOUNDRY RESEARCH — At Watertown

Adoption of the centrifugal casting process marked an important step in gun barrel production. Influence of foundry research in this development is discussed in this sixth of a series of articles on such experimental work

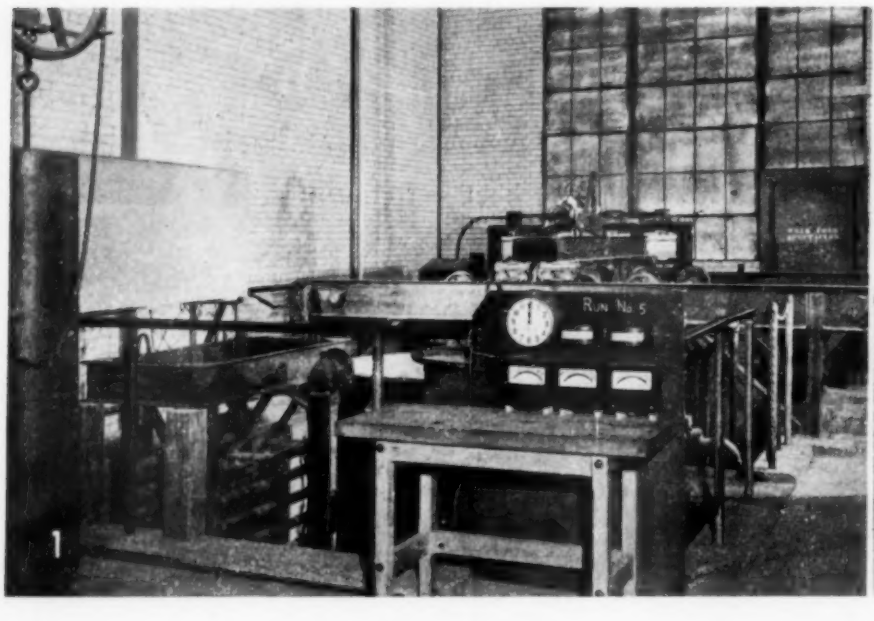
A fairly complete history of the development of numerous kinds of ordnance since before the War of 1812 could be compiled from the activities of Watertown Arsenal alone, because the origin of that important unit of the Army's Ordnance Department dates back more than 125 years. And it probably would be found that research and experimental work in basic materials and manufacturing processes, particularly in ferrous metals, was largely responsible for many of the major improvements made in weapons during that period.

Watertown Arsenal is both a manufacturing plant and a laboratory. In wartime its extensive facilities permit it to accentuate the former role to make it one of the leading sources of different types of ordnance, although primarily the Arsenal serves as a pilot plant which makes available to civilian war plants the techniques and processes developed at Watertown.

The Arsenal originally was established in Charlestown, Mass., in 1800, but later it was moved to Watertown, now the outskirts of Boston. Cornerstone of the first building was laid there in 1816. A variety of ordnance was made in those early days, although the plant employed only 40 men. Activity increased sharply during the Civil War, involving production of gun carriages, musket balls, cartridges and miscellaneous ordnance supplies, but operations slackened thereafter and from 1870 to 1872 the Arsenal was used as a storehouse.

Research work was inaugurated in 1880, when a testing and experimental laboratory concerned with ferrous metals was established. As a center of all ferrous research for the Ordnance Department, Watertown Arsenal today is continuing this phase of its overall job that was started 65 years ago.

World War I brought expansion in Watertown's facilities for the manufacture of guns and gun carriages, items in which the Arsenal has specialized for many years and which comprised its principal productioin during the late war. Between these two wars, however, a drastic change was made in the method of producing gun barrels—a development which stood the country in good stead after Pearl Harbor, when we needed many guns quickly. This was the adoption of the cast steel gun barrel. While this marked a return to castings, a product abandoned many years ago for guns in favor of forged steel, perfection of the centrifugal process for making the barrels resulted not only in improved metallurgical and physical characteristics but also



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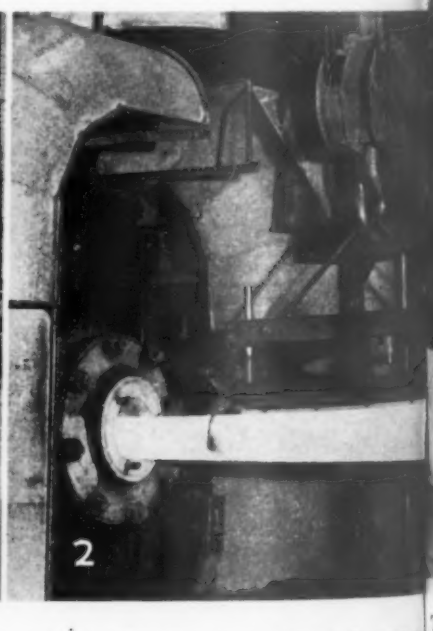
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By WILLIAM G. GUDE
Associate Editor
THE FOUNDRY

wn Arsenal

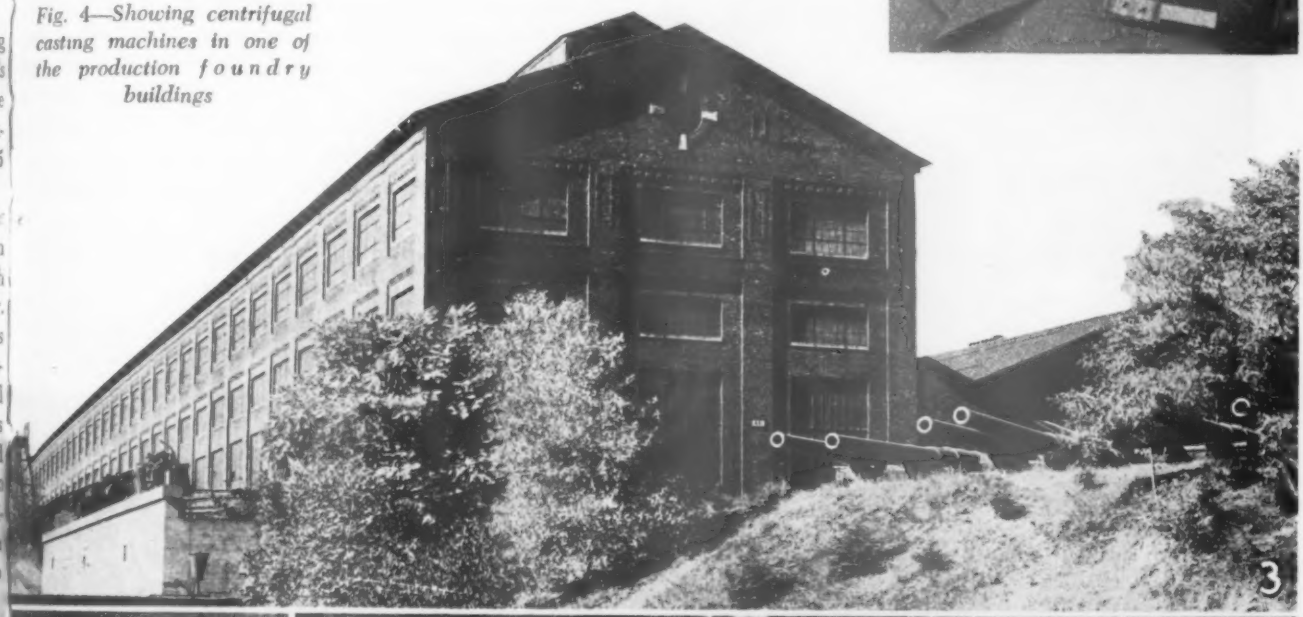
Col. John Mather, commanding officer, Watertown Arsenal, Watertown, Mass.

Fig. 1—General view of heat treating equipment in Arsenal's experimental foundry where research in centrifugal casting of gun barrels is conducted

Fig. 2—Removing 90 mm cast steel gun barrel from centrifugal machine 23 minutes after molten metal was poured

Fig. 3—Exterior view of one Arsenal foundry building

Fig. 4—Showing centrifugal casting machines in one of the production foundry buildings



brought savings in weight and in the time, labor and material required in production.

Without the centrifugal gun casting technique developed at Watertown, it is apparent that our procurement of artillery in early months of World War II would have lagged considerably, since there was not enough heavy forging and pressing equipment to make the forged type gun in desired quantities, and considerable delay would have occurred in building new equipment. With the start of the war, Watertown stepped up its production of gun barrels sharply; it cast its first barrel on Oct. 3, 1925, and by 1940 had made less than 4000, but in early 1944 it turned out No. 100,000, an achievement marked by appropriate ceremonies in a coast-to-coast broadcast on the "Army Hour."

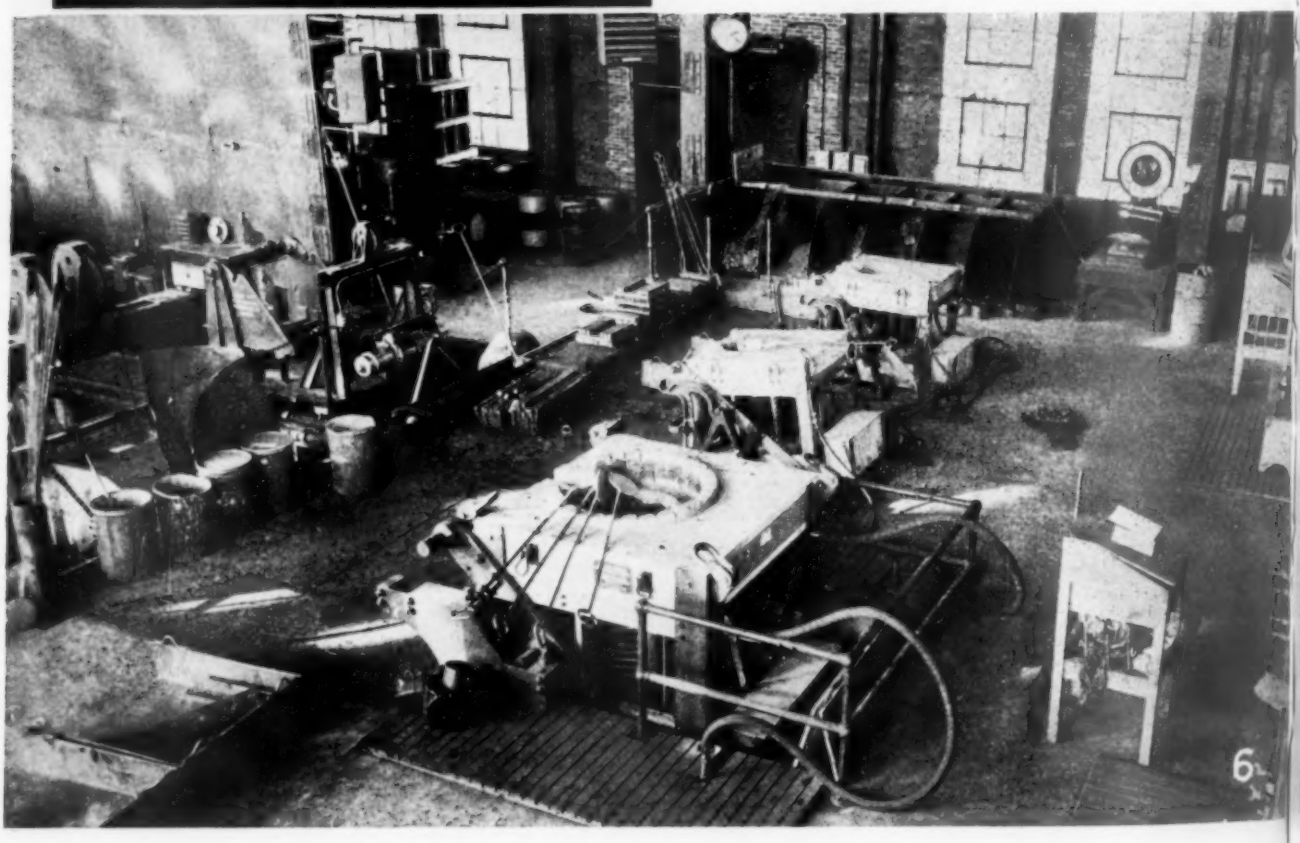
To supplement the Arsenal's output a plant of like capacity was built early in the war near Houston, Tex. Known as the Dickson Gun Plant—after Brig. Gen. T. C. Dickson, former Watertown commandant, who was responsible to a large degree for development of the centrifugal cast gun barrel—this plant employed the same manufacturing procedure as at Watertown, except for the omission of cold working by autofrettage, because of the shortage in hydraulic equipment.

Four major departments comprise the Watertown organization—laboratory, inspection, engineering and production—all under the supervision of Col. John Mather, commanding officer. Colonel Mather assumed charge just prior to Pearl Harbor to direct the Arsenal in the largest wartime production program of its history.

In addition to a planning di- (*Please turn to page* 186)

Fig. 5—Quenching 90 mm anti-aircraft gun barrel during heat treating process

Fig. 6—Part of melting equipment. Each furnace serves also as ladle to pour molten metal into centrifugal machine



Dust Removal

AT BELT TRANSFER POINTS

By C. C. HERMANN
Grosse Point Park, Mich.

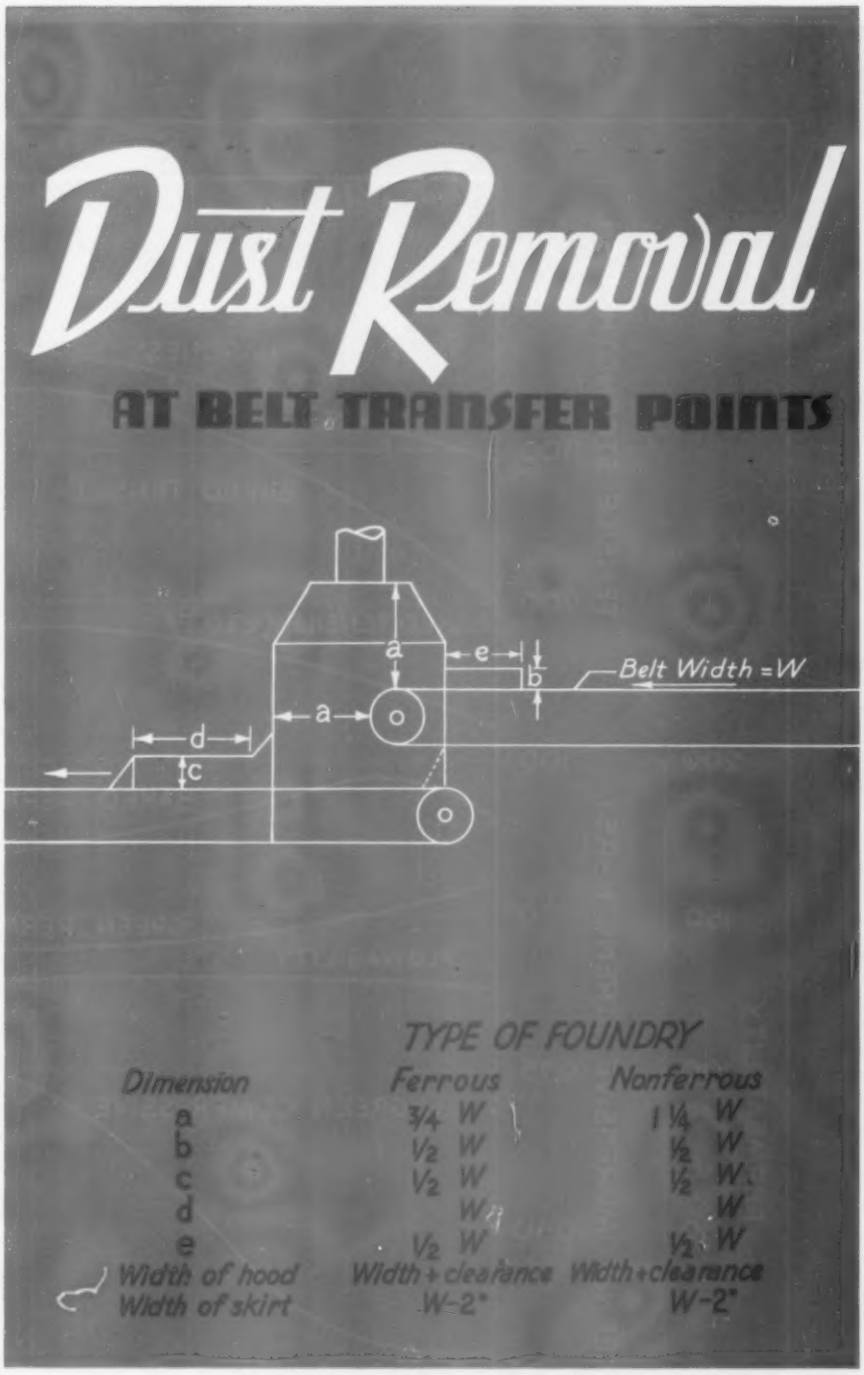
IN THE design of the hood for the belt transfer points of the sand handling system, consideration must be given to the type of foundry, whether gray iron, steel, aluminum, brass or magnesium. Air volume and velocity used at the hood will depend on the foundry and will be different for the ferrous and nonferrous groups.

In the steel foundry the sand will be handled at a much higher temperature, will contain greater amounts of bond, such as bentonite, cereal and clay binders, than in the gray iron foundry. However, usually it is practical to use the same design of hood accompanied by the same air velocity and volume. The molding process involves both dry and green sand.

In the nonferrous foundry a very fine close sand is used and very little fines are removed. The fine sand floats readily in the air and is easily picked up by air currents. The velocity at the hood must be considered carefully to avoid the loss of too much sand.

Consider the transfer belt hood design from the gray iron and steel foundry angle. First let us go through a typical sand handling system and determine where belt transfer points exist, points which must be ventilated. The first transfer point is at the discharge end of the vibrating or pan conveyor beneath the shakeout. This conveyor discharges either onto a magnetic separator belt or onto the magnetic pulley, which generally is the terminating pulley of the conveyor. Here the iron remaining in the sand from the shakeout is removed before the sand goes into an elevator for raising to the screening equipment or to a breaker screen in case there are dry sand cores to be broken up. In some foundries the breaker screen separates rods and pieces of iron from the sand with a magnetic separator which follows the breaker and removes the finer pieces of iron.

Whether one system or the other is used this first belt transfer point is the point of heaviest dust load. The hot sand is loaded with binder which fumes up at this point unless the system is equipped with a very efficient dust removal hood over the shakeout and additional removal at the hopper beneath the shakeout.

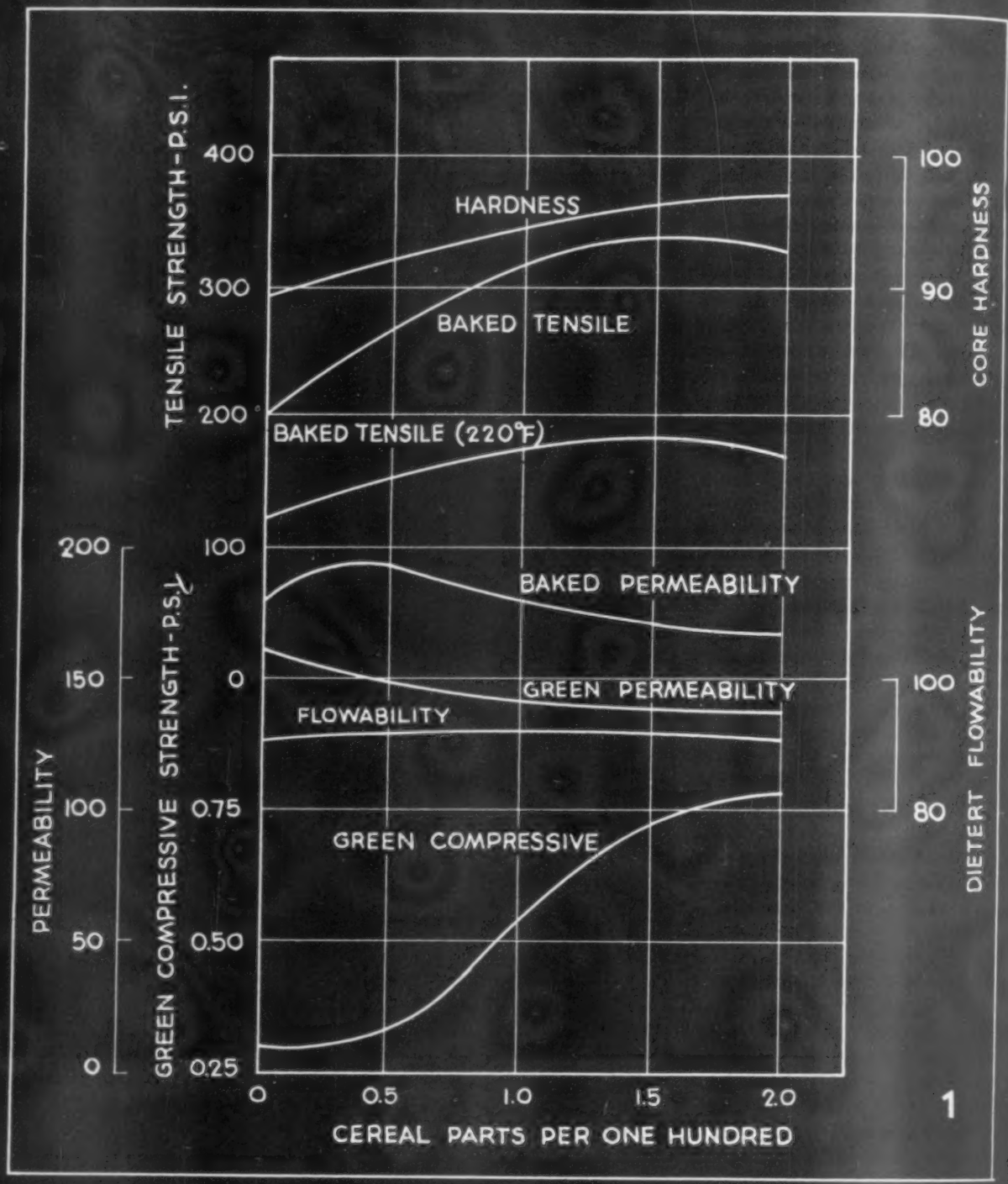


Dimension	TYPE OF FOUNDRY Ferrous	Nonferrous
a	¾ W	1¼ W
b	½ W	½ W
c	½ W	½ W
d	W	W
e	½ W	½ W
Width of hood	Width + clearance	Width + clearance
Width of skirt	W-2"	W-2"

Typical belt transfer point hood showing principal dimensions in relation to belt width for ferrous and nonferrous installations

The second point for transfer hooding is at the discharge to the boot of the elevator. The third point is the discharge from the elevator to the short belt usually found between the elevator and the screen. The fourth point is the discharge from the belt to the screen, and the fifth point is the discharge from the screen to the belt designed to distribute the sand to the storage bin. In some systems additional belts are required to move the sand greater distances and around corners. However, the foregoing outline may be considered a minimum requirement. Additional transfers would be treated the same as those given.

As a result of this analysis we have essentially (*Please turn to page* 226)



By A. E. DeCLERCQ
and
TOM BARLOW

Effective Use of

CEREAL CORE BINDERS

AT THE PRESENT time, many foundries in this country employ corn flour (cereal) core binders in some or all of their core-sand mixtures. In spite of this widespread use, there appears to be a definite lack of quantitative information describing methods for using these materials to their greatest advantage. The advantages are adequately described in the literature and are known to most foundrymen, but the minor (or major) details which may make the difference between economic use and comparative waste of a material have not been well established. It is for this reason that the authors have attempted to correlate some of the data recently developed by N. H. Keyser and C. H. Lorig, during a research investigation at Battelle Memorial Institute, with observed foundry practice, in the hope that this information will help foundrymen to derive maximum benefit from cornflour core-binding materials.

As a review and to establish a substantial foundation for further discussion of effective utilization of corn flour, it is desirable to review the reasons for the application of these materials by the foundry industry. It is impossible to list the properties of corn flour in the order of their merit, since any one property may be of much greater interest to one foundryman than to another because of circumstances in a particular plant. It is entirely possible that one of the supposedly minor advantages of these binders may, under certain circumstances, make all the difference between good cores (and, therefore, good castings) and poor ones. Therefore, taking the characteristics of corn flour as a core binder in a random order, the major considerations may be described under nine headings as follows:

1. *Green Strength*—Effect of corn (*Please turn to page* 192)

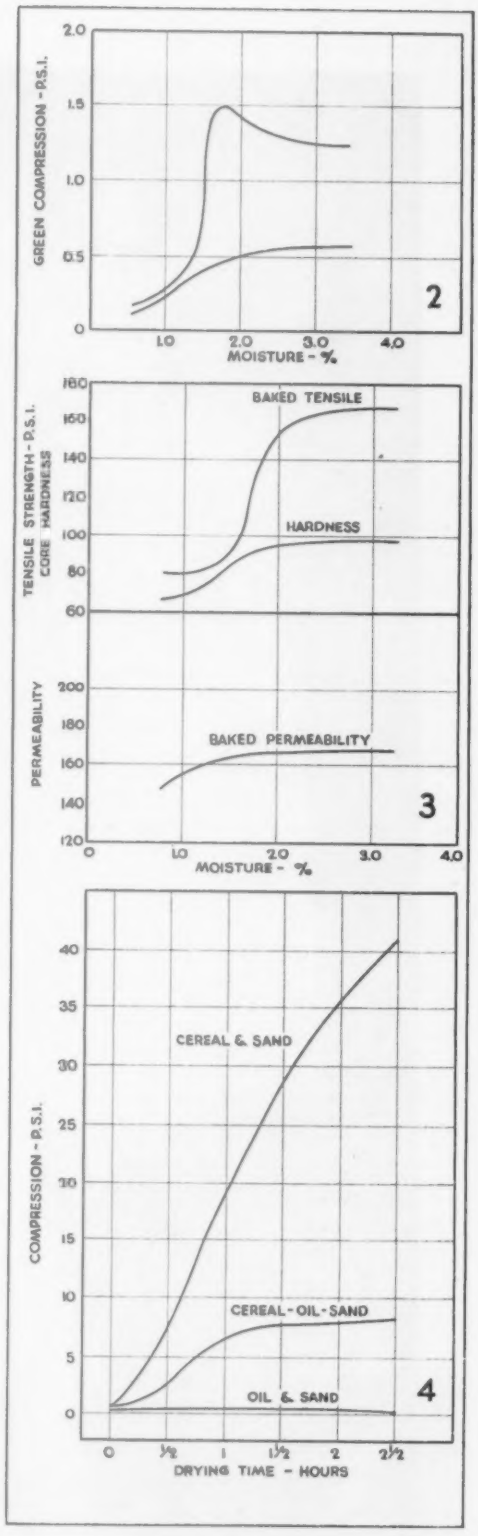


Fig. 1—Effect of increasing amounts of corn flour on various properties of oil-sand mixture (1.35:100) containing 2.5 per cent moisture. Actual figures shown apply only to this mixture but trend of curves is typical of such mixtures

Fig. 2—Relationship between green compressive strength and moisture content of two core mixtures. Upper curve is for oil-cereal-clay-sand mixture of ratio 1.16:1.16:0.30:100; lower curve for oil-cereal-sand mixture of ratio 1:1:100. Both use AFA testing sand as base

Fig. 3—Relationship between moisture and some baked physical properties of oil-cereal-clay-sand mix of ratio 1.16:1.16:0.30:100. Baked at 450 F one hour

Fig. 4—Relationship between air-dried strength and time of air drying of oil-cereal-sand mixture of ratio 1.35:1.07:1.00 with 2.5 per cent moisture, mulled for 6 min. Center curve is for complete mixture; oil omitted from top curve; cereal omitted from bottom curve

Fig. 1—Tapping a melt from 5-ton oil-fired furnace at Bethlehem brass foundry

By PAT DWYER
Engineering Editor
THE FOUNDRY

Tuyeres in the Bethlehem Foundry

BUILT on the sides of two hills that rise steeply from the banks of the Lehigh river, the city of Bethlehem, Pa., presents many interesting features whether viewed from a historical, scenic or industrial background. It was settled by the Moravians about 200 years ago. It has the most remarkable bridge in this or probably in any other country in the world. It is the site of Lehigh University and it is the home of the Bethlehem Steel Co., which with subsidiary plants in other locations is the second largest producer of steel in the United States.

The city still is permeated with references to the Moravians past and present. Various places and objects bear the name Nicholaus Ludwig, Count Zinzendorf, powerful protector and patron of the persecuted brethren, who furnished transportation for the first colonists and gave them a grant of land on his extensive property at the forks of the Delaware.

Hardy pioneers, actuated by the highest ideals and everyday exponents of the cardinal virtues, the colonists flourished like the proverbial green bay tree and built up a wealthy and influential community. Their young ladies' seminary is one of the oldest in America. For many, many years they have maintained a theological seminary where young men with a religious vocation are kept and educated free of charge.

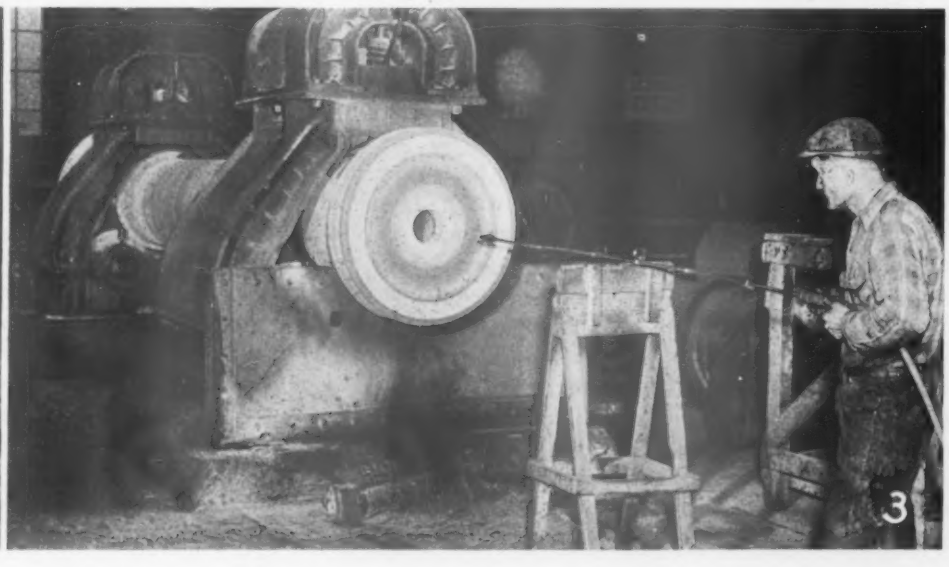
The concrete bridge connecting the hills on both sides of the river, and the level strip between, has eight main approaches, four at grade level from the hills and four in the form of long ramps leading up from points in the valley. A local wit from Philadelphia at one time claimed that a certain popular song, "Show Me The Way To Go Home," was composed while the author was marooned all night on the bridge. Needless to say, this vile canard was treated with silent contempt by the local paper.

About 1860, John Fritz came from the Cambria Works in Johnstown, Pa., to take over the management of the young Bethlehem Iron Co. During a long and brilliant career, he converted the little iron working plant into a prominent steel making enterprise. He revolutionized blast furnace practice and invented improved types of rolling mills. He installed converters for making steel, shortly after Bessemer developed the process in England and John Kelly developed the same process in the United States. Controversial priority claims of the two inventors persist down to the present and apparently are no nearer solution now than the two burning questions of a slightly later period, "Who stole Charlie Ross?" and "Who struck Billy Patterson?"

To maintain the great dragon, breathing fire and smoke, typified by the roaring mills and furnaces, Fritz organized

Fig. 2—Pouring a ladle of bronze metal into pouring basin of centrifugal casting machine

Fig. 3—Cooling bronze casting. Machine produces castings 8 to 14 in. OD up to 200 in. long



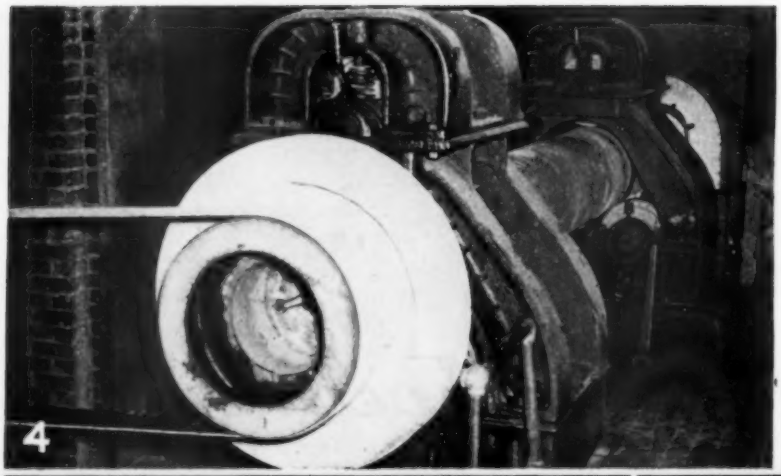
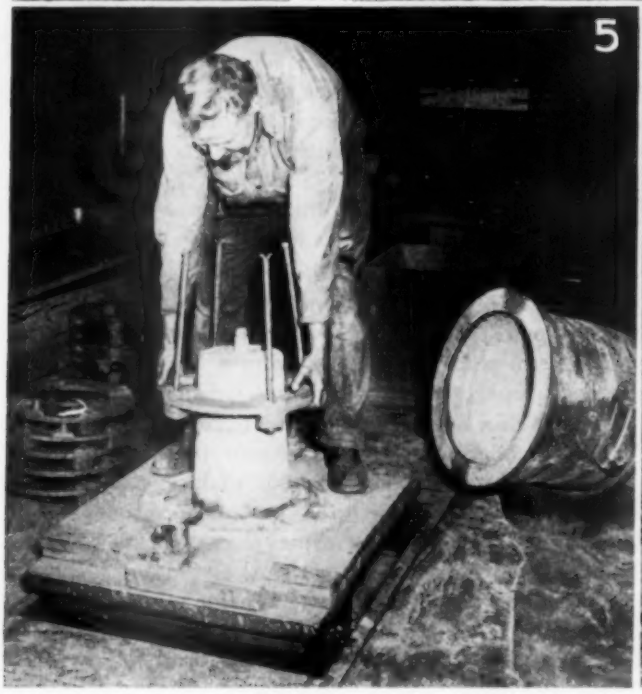


Fig. 4—Rear view of centrifugal casting machine showing drive and roller housing
Fig. 5—Lowering core drying plate over center plug on jarring machine to produce jacket core for blast furnace tuyere. Outer part of core box at right
Fig. 6—Lowering corebox onto jarring machine after drying plate properly placed
Fig. 7—Placing cope section over jacket core of blast furnace tuyere casting
Fig. 8—Placing dry sand jacket core over green sand center core. Tit cores are formed around threaded vent pipe. Core secured with four nuts shown on plate
Fig. 9—Drawing crucible from coke-fired furnace



a mechanical department and erected shops for their activities. The group of shops included a stone-wall gray iron foundry on which the roof was supported—and, incidentally, is still supported—by wrought iron beams, stringers and purlins rolled on the first three-high mill in the state of Pennsylvania—or elsewhere. The beams outlasted the famous ironmaster and several successors, and apparently are in as perfect condition today as they were when the building was erected.

In later years as the plant expanded to its present proportions, 3 miles in length and ¾-mile in width, additional foundries were erected and placed in operation. At present the group includes a nonferrous foundry, a gray iron foundry, a steel foundry, a roll shop and a foundry devoted exclusively to the production of ingot molds.

Detailed description of many interesting features in each of the foundries will be presented in later issues of THE FOUNDRY. For the present, it may be pertinent to state that the Bethlehem Steel Co. has produced some of the largest and heaviest castings in this country. So far as available records show, the weight and size of two castings, one iron and the other steel, never have been equaled in this or any other country. Description of a 200-ton ingot mold, 9 ft 3 in. x 16 ft 7 in. x 13 ft 9 in. high, appeared in THE FOUNDRY, May, 1944. The other casting was a steel platen for a hydraulic forging press. Approximately 290 tons of steel was poured into the casting, runners and sinkheads. The cleaned casting, 10 ft 2 in. wide, 12 ft 10 in. high and 23 ft 4 in. in length, weighed 230 tons. Detailed description of employed foundry technique in handling this huge casting was presented in the Sept. 1, 1931 issue of THE FOUNDRY.

In the proposed series of articles, the present one will be confined to the nonferrous foundry. No. 2 will deal principally with the methods and equipment employed in the production of large gray iron castings. No. 3 will be devoted to the steel foundry. No. 4 will deal with certain features in the roll foundry. No. 5 in a somewhat similar manner will cover foundry technique in the ingot mold foundry where the castings are made with metal direct from the blast furnace.

Nonferrous castings in a wide variety of alloys and for the myriad purposes for which castings are employed in a steel plant, also a considerable tonnage for outside in-

terests, are made in a building 50 x 200 ft. This is essentially a jobbing shop in which long runs of duplicate castings are the exception and not the rule, and where weights of individual castings range from a few ounces to 5 tons or more. The main exception to the general rule is a section of the floor fitted up specially for the day-in, day-out production of blast furnace tuyere castings.

Flexibility in the melting program to meet any set of conditions is provided by a battery of nine pit type, coke-fired crucible furnaces, and one small and two large tilting type, oil-fired, open flame furnaces. Each of the pit furnaces with sliding cover flush with the floor, accommodates a 675-lb capacity crucible. Each of the large open flame furnaces has a normal melting capacity of 10,000 lb. The pit furnaces are near one end of the foundry, with the open flame furnaces near the center.

Blast furnace tuyeres are made in several sizes and according to several designs. The casting forms the nose of the blow pipe which delivers air to the blast furnace and for that reason takes the form of a hollow shell through which water circulates. They are tested under water pressure before being placed in service, where their life is comparatively brief exposed to the high temperature in the blast furnace. When the end springs a leak the tuyere is removed and replaced by another. Average wall thickness is ⅜ to ½ in. and average weight is 150 to 200 lb.

These tricky castings are made in several foundries in industrial centers with methods and equipment that are fairly satisfactory. Some foundrymen insist on dry sand molds, while others stick by green sand. In some shops the casting is poured big end up, with the chamber core suspended from the cope or supported on chaplets in the bottom. In other places the entire pattern is molded in the cope, big end down, with the core resting on the water inlet cores and anchored with wires through the bottom board. The rig in the Bethlehem foundry represents the culmination of a long series of trials with practically every known method. It is eminently satisfactory in that it produces castings in a highly satisfactory manner, with a minimum amount of labor and with elimination of practically all hazard.

The casting is molded and poured big end down, with the entire body in a one-piece cast iron flask that serves for both cope and cheek. The drag is one of the unique features of the equipment. It is a cast iron plate ribbed on the bottom for strength, drilled on the face for core prints and equipped with a pair of stationary pins for guiding the cope into place. The face is machined to a true plane and carries a single small gate channel from a point near one corner to a point near the (*Please turn to page* 234)

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Molds of Rubber for Casting

Q.—We are confronted with several molding problems on which we have been advised that they could be overcome by use of cast rubber molds. The particular problem is that of irregular shapes which have a reverse draft. We understand that in the rubber molding process, liquid rubber is poured around the pattern and stripped off. That mold then is used for making castings. Have you any information on the subject?

A.—So far as we know rubber molds only can be used for casting of low melting point alloys, such as Wood's metal, etc., since rubber will not withstand heat. The use of rubber molds generally is relegated to production of large quantities of statues or similar art work. Rubber composition is cast around the original piece, split into two sections and removed. Rubber mold is backed with plaster or sand and the low melting point alloy poured in. After a short period of setting the remaining liquid alloy is poured out leaving just a shell of metal conforming to the contour of the original. That shell is cleaned and then plated with copper or other metal. Then the low melting point alloy can be melted out, leaving the thin shell which is filled with lead, or the combination shell as removed from the plating bath can be filled with lead.

You do not mention what material you want to use for the castings, but we believe that it is one which cannot be poured into rubber. Possibly you might be able to use the rubber mold process for forming low melting point alloy patterns. Those could be rammed in plaster or dry sand composition, placed in an oven and heated. Molds would be placed so that the alloy could run out when melted. After that has taken place, the mold then could be used for making the casting in the desired metal. Similarly a wax pattern could be used.

We do not believe that there is anything special about the rubber used for such molds except of course that it must be in the unvulcanized state so that it can be dissolved in benzol or other rubber solvent. Undoubtedly any of the large rubber firms can supply the proper material.

Questions and Answers

Zinc Smoke Results in Defect

Q.—We are making some flanges of thin section from an alloy composed of 85 per cent copper and 15 per cent zinc, and are having trouble in that seams or whiskers appear on the surface. We make the alloy by melting the copper and then add the zinc. Considerable smoke comes off the metal. We have tried pouring at temperatures from 2200 F down to 2000 F, and while the seams have decreased, they have not been entirely eliminated. We think that they are due to zinc smoke, and would like to know how to overcome the occurrence of the defect through proper pouring temperature, use of cover or other flux, etc.

A.—From your description it appears that the trouble you are encountering results from the deposition of zinc oxide or smoke on the cold face of the mold. Since zinc boils at about 1665 F, its evolution from the copper-base alloy cannot be prevented at usual pouring temperatures. To some extent its escape to the atmosphere during melting can be ameliorated by use of a cover flux composed of broken glass or similar material. However, when that is skimmed off previous to pouring, zinc oxide will be given off. If the castings do not have to withstand pressure some of the smoking can be restrained by use of 1 or 2 oz of aluminum per 100 lb metal.

Main point in pouring high-zinc alloys is to keep the pouring temperature as low as possible without running into cold shuts. You already have found an improvement in reduction from 2200 to 2000 F, and our suggestion would be to try one gate of castings at 1900 F to see what happens. That may result in some cold shuts, and if it does increase the temperature to 1950 F. Metal should be poured into the mold as quickly as possible since slow pouring permits distillation of zinc within the mold cavity. Also to ensure rapid filling of the cavity, the gates should be as large as possible. In melting the temperature should be only allowed to go slightly above that for pouring, say 100 F to take care of the temperature drop.

Melting Pots Are Defective

Q.—For many years we have made cast iron pots 20 in. deep and 40 in. diameter for melting type metal. Average life of these pots has been three years, but recently this has been reduced to 6 months. In the last pair made the metal sweats through the bottom and side walls. The cupola mixture contains 25 per cent steel and the molds are dried. In service the pots are fired with coke containing 2.00 per cent sulphur. We shall appreciate your opinion.

A.—Makers of cast iron pots, exposed to constant heat, for melting type metal and other metals that melt at a comparatively low temperature, have found that a dense, close

grained metal with silicon below 1.00 per cent, gives the most satisfactory service. Apparently you were using metal of this composition in the former pots which lasted, as you claim, from 3 to 5 years. A checkup of the present metal compared with the composition of the former metal will disclose a possible discrepancy. Recommended analysis for melting pots for caustic, lead, zinc and aluminum is: TC 3.30 per cent, Si 1.00 per cent, Mn 0.65 per cent, Cr 0.75 per cent, Ni 2.00 per cent. With 20 to 50 per cent steel in the cupola charge the tensile strength of this metal is around 40,000 psi and the brinell hardness about 230.

Without a knowledge of many factors omitted from your description, we can only venture a guess at the cause of the trouble. Basing our views on general experience we are inclined to the opinion that the molding practice and not the metal is responsible for the defective condition of the castings. The molds are made in dry sand, but a possibility exists that the molds are not dried thoroughly, or that provision is not made for ready escape of the gas. The inside of the core should be filled with coke or cinders, or a large block might be rammed in the center and then withdrawn to convert the core into a shell instead of a solid mass of hard packed sand. A hard core will cause the metal to boil. This boiling action may not be sufficiently violent to dislodge any of the sand face, and it may cease before the metal appears in the riser, but it causes damage by the fluttering action. The resulting casting may be smooth and clean on the face, but it is porous on the inside. In mild cases the porosity is microscopic, but it is sufficient to shorten the life of the casting.

Needs Bronze for Bearing Use

Q.—Will you give us information on how to make a good leaded-bronze casting, including formula, the best method of pouring, etc. These are to be used for bearings to operate under moderate high speed, relatively light load conditions of under 1000-psi and over 1500 rpm. Bearings are for use in rotary draw works, gas engines, clutch pulleys, etc.

A.—Probably the bearing alloy which will meet your needs is the medium high lead bronze having a composition range of 73 to 80 per cent Cu, 5 to 7 per cent Sn, and 15 to 20 per cent Pb. This alloy, like all those of high lead content, is susceptible to gassing during melting with resulting porosity in the castings. Consequently, care must be taken to see that proper melting conditions are maintained. Many foundrymen use a slag or flux cover during melting to protect the metal from the furnace atmosphere, and find that one composed of borax, soda ash and silica sand or glass functions well. Proportions of the compounds vary from foundry to foundry, but you might try 4 parts borax, 2 parts soda ash and 4 parts silica sand.

Due to the tendency to gas pick-up, it may be advisable to make an addition of copper or lead oxide to the molten metal about 3 to 5 minutes before pouring, using about 1½ oz per 100 lb. Stir the addition in well, and just before pouring make the usual addition of phosphor-copper for deoxidation purposes. Pouring temperature of the alloy may range from 1850 to 2200 F depending upon section thickness. Castings may be poured horizontally or vertically, and the choice of method will depend on experience and practice. While some foundrymen do not use risers, that practice is not advocated.

Holes and Pits in Brass Ring

Q.—We are sending you a brass ring which is used in fire fighting equipment. It contains some defects which are typical of those found in many of our castings. The castings appear sound before machining, but after that operation small pockets and pits show up. Much of the work has to be buffed and plated, but those blemishes cannot be removed satisfactorily.

A.—The ring which is 6¼ in. outside diameter, 4¼-in. inside diameter and 2¼ in. high shows as you mention numerous surface imperfections which apparently are due to several causes. Two of them are the result of careless molding and pouring practice in that some of the pockets or pits as you call them contain dross or slag, and molding sand. They first indicate faulty skimming or lack of attention to the crucible lip during pouring. Presence of molding sand may be due to carelessness in blowing off the mold face or in closing which breaks off pieces of sand. Other possibilities are that the sand may be on the weak side as far as bond is concerned, clay balls or excess moisture in certain spots which result in a slight boil, or too much crush at the mold joint.

In addition to those defects the casting indicates that melting is not all that it should be since the metal has been gassed. Therefore, it is suggested that you look into that operation to see that the metal is melted under slightly oxidizing conditions, that it is melted as rapidly as possible, and removed from the furnace as soon as it reaches a temperature about 100 F above that desired for pouring. There also is the possibility that a better casting may result if a heavier riser is used with the section where it joins the casting almost equal to that of the casting. Economy suggests elimination of risers as much as possible, but in most instances they are necessary.

GANGWAY!

By J. A. Patterson

"Well, what would you do? Th' big boob says he sat down on a bunch of metal shavings!"

Hollow Roll Is Defective At the Shoulder

Q.—We shall appreciate your opinion on the cause of shrinkage defects which appear in the shoulder of a long, hollow cast iron roll shown in the attached print. Upper and lower necks are 11 in. in length and 8 in. diameter. The main body is 87¼ in. in length and 20 in. diameter. Core through each neck is 2½ in. diameter and through the body is 14 in. Average thickness of metal all through the casting is 3 in. Metal enters the mold through a gate near the lower end of the body and the casting is fed through an enlarged extension to the neck 20 x 20 in. The shrinkage cavities appear in the upper shoulder between the body and the neck.

A.—The general features outlined, the presumably whirl gate near the bottom and the large feeding riser conform to regular roll making practice. Position of the gate, as shown, prompts a question. If the entire mold is made in sand, it may be gated as shown. If the body of the mold is formed in a chill, as a note on the drawing indicates, the gate would have to enter at a point below the chill. However, the position of the gate is not a factor in the development of a defective area around the upper shoulder. The cavities are caused by gas from the core and not by shrinkage of the metal. The immense volume of gas created in the large body core has to escape through vents in the small upper and lower neck extensions. These openings should be as large as possible.

If the gas cannot escape rapidly through the vents, a certain amount will bubble through and will be trapped in the metal of the upper shoulder. The main body of the core is only a shell 3 or 4 in. thick filled with small dry coke. A piece of steel pipe 1½ in. outside diameter serves as reinforcement in each neck and also as a passage for the gas when the core is surrounded by metal. If its presence would not interfere with the function of the roll, a piece of 2½-in. inside diameter steel pipe could be substituted for the sand core in the upper and lower necks. The ends could be cut off in the finishing process and the piece of pipe could remain in the casting.

Iron Sheaves Develop Cracks in Webs

Q.—We are forwarding for your inspection a gray iron sheave 7 in. diameter, hub 2 in. diameter and web thickness 3/16-in. The groove around the rim is made with a two-part cast iron chill. The cupola charge is 100 per cent machinery scrap. The castings crack through the web almost all the way around the hub. We shall appreciate your opinion on the cause and the proper remedy.

A.—In some castings a crack may be traced to an unbalanced design. In others the character of the metal is responsible. In the casting submitted for inspection, both these factors are present. The heavy hub is out of all proportion to the comparatively heavy rim and to the exceedingly thin web. Iron from an all scrap cupola charge lacks that small degree of elasticity found in castings made from a mixture containing a certain amount of virgin pig iron, especially the grade known as malleable or bessemer pig iron.

Assuming that for any one of several good and sufficient reasons, a supply of pig iron is not available and that you are forced to continue using an all scrap charge in the cupola, this factor may be dismissed from any remedial or preventive measure. The simple and common sense solution to the problem is to put a center core in the hub, and increase the thickness of the web to at least 1/2-in. In this manner the cooling speed of the entire casting is fairly uniform. Incidentally, and of course this has no bearing on the cracking feature, in the process of examining the casting we noted evidence of careless or inexperienced molding and pouring technique. Particles of loose sand are bedded here and there on the surface. A thin line of slag is present for a distance of about 4 in. in the upper rim.

AFA EXCHANGE PAPER

The excellent article, "Gray Iron Production for War," by James S. Vanick, International Nickel Co., New York, which was presented in the November issue starting on page 96, was the official exchange paper of the American Foundrymen's Association to the French Foundry Association, and was prepared at the request of the AFA for presentation at the recent Paris meeting. THE FOUNDRY *regrets that this information was not included in the original presentation.*

Insulated Ladle Keeps Metal Hot 48 Hours

Q.—If molten iron is tapped from a blast furnace into a heavily insulated railroad ladle how long would it remain hot enough to be used in the foundry? Would it be possible to transport metal in that manner half a mile from the blast furnace to the foundry? Would pure foundry pig iron without any scrap addition be acceptable for making stove plate, furnace castings etc?

A.—Between 20 and 25 years ago—a man named Pugh invented what later became known as the torpedo, or submarine ladle for carrying large quantities—150 tons—of blast furnace metal comparatively long distances, in one place 12 miles from Hamilton to Middletown, O. The ladles served as mixers and in the majority of instances the metal was poured into open-hearth furnaces. Other installations included Bethlehem Steel Co., Youngstown Sheet & Tube Co., Great Lakes Steel Corp. and others.

The latest user of this practice is the Valley Mould & Iron Corp., which carries hot metal from the American Steel & Wire Co.'s Central Furnaces down near the river, a distance of 6 miles to the ingot mold making plant in Cleveland. Usually the iron carried from blast furnace to open hearth or foundry is poured within an hour or two, but several instances are on record where the metal was held in the ladle for a period of 48 hours.

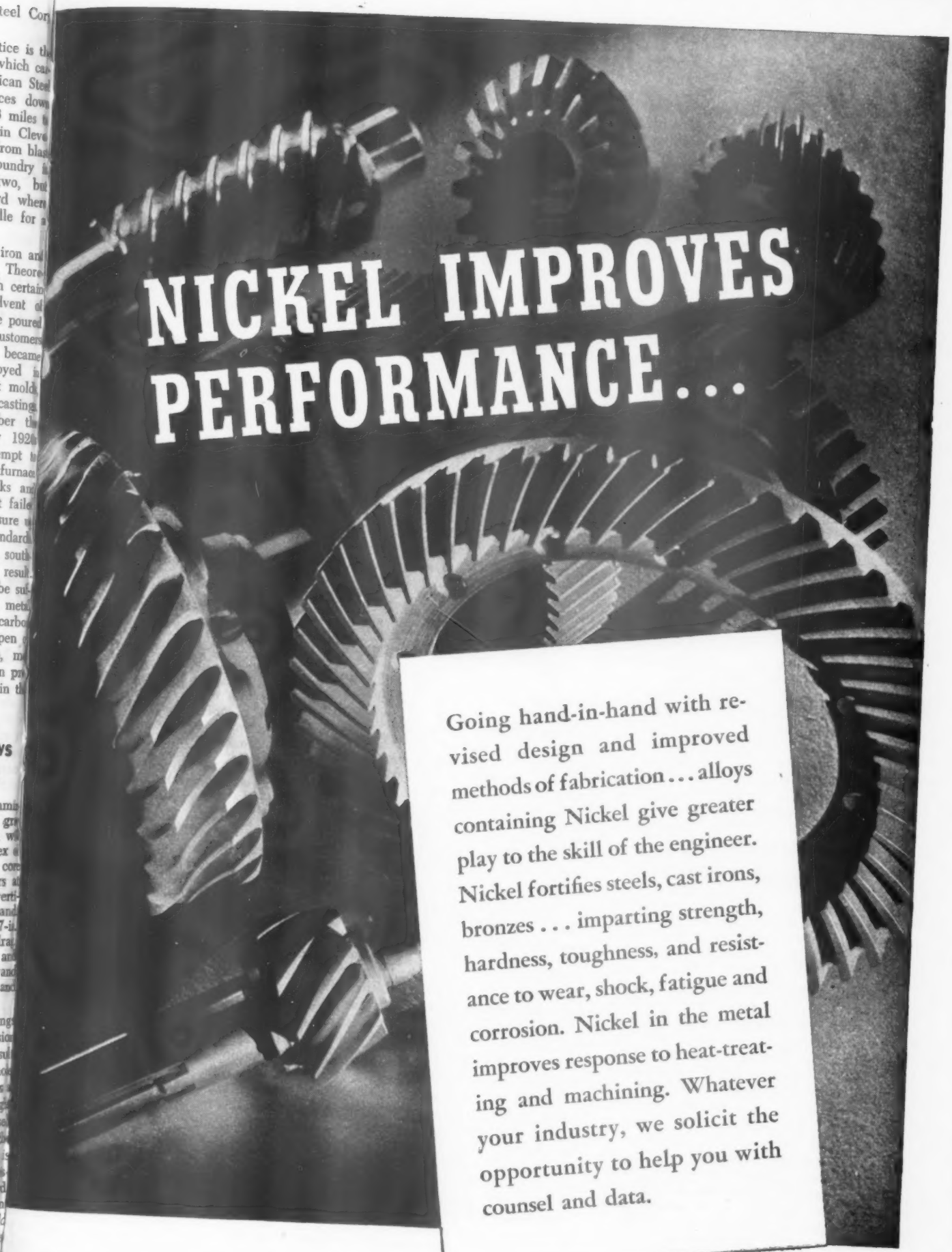
Replying to question on pig iron and scrap, the answer is yes and no. Theoretically yes, but practically—with certain exceptions—no. Before the advent of the cupola all iron castings were poured from direct metal, but the customers were not as exacting as they became later. Direct metal is employed in several plants for pouring ingot molds, stools and miscellaneous heavy castings. You may or may not remember the frenzied publicity in the early 1920's dealing with Henry Ford's attempt to take metal direct from the blast furnace and pour it into cylinder blocks and other auto castings. The attempt failed because the castings did not measure up to chemical and metallurgical standards. A similar attempt was made in a southern pipe shop, with the same result. Without going into detail it may be sufficient to state briefly that direct metal is too high in free or graphitic carbon and the grain of the iron is too open or coarse. Problems in temperature, mechanical equipment and distribution prevent the use of blast furnace iron in the ordinary foundry.

Core and Steam Blows Present in Castings

Q.—We are sending for your examination two sections of some small gray iron castings we make. In one you will note that a hole appears at the apex of the groove which is formed by a core while in the other the hole appears at the junction of the horizontal and vertical faces which is formed in green sand. Two castings are made in a 12 x 17-in. snap flask with 6-in. cope and 6-in. drag. Molding is performed on the bench and the sand used while fine is very open and will stand extra ramming. All copes and drags are well vented.

A.—Examination of the two castings submitted to us leads to the conclusion that the defects in both are the result of blows. In the one where the hole is in the cored groove, the trouble is a core blow since the opening has a bright shiny surface indicating that it was caused by a reducing gas generated by the binder in the core sand. The core is practically surrounded and the only escape for the core gas is downward. Hence, our suggestion is to run a vent wire down at an angle through the mold in several places, and see that the vent reaches to the exterior face or bottom of the mold. Also see that the opening

(*Concluded on page* 118)



Going hand-in-hand with revised design and improved methods of fabrication... alloys containing Nickel give greater play to the skill of the engineer. Nickel fortifies steels, cast irons, bronzes . . . imparting strength, hardness, toughness, and resistance to wear, shock, fatigue and corrosion. Nickel in the metal improves response to heat-treating and machining. Whatever your industry, we solicit the opportunity to help you with counsel and data.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

(*Concluded from page 116*)

at the bottom are not cut off by a close fitting bottom board—using scratches or other means to let the gas get away. Of course, it also is possible that some of the cores may be rammed a little too hard, or too much binder is used—resulting in a hard, dense core.

In the other casting where the hole appears at the top junction of the horizontal and vertical sections, the cause of the defect is a blow from steam since it shows an oxidized surface. That may result from a number of causes such as clay or sand balls, a piece of tramp iron, too hard ramming, too heavy use of the swab, etc., and your guess is as good as ours as to the exact source. While you mention that you have good venting, we suggest that you look over that feature where a re-entrant angle exists. Steam generated along the vertical surface tends to shoot off at right angles or perpendicularly to that surface. Likewise the steam from the horizontal surface comes off perpendicular to it. Result is that the two streams join or double up a short distance away—and due to condensation, tend to block each other with a good chance of a kickback in one direction or the other. Our suggestion would be to vent at an angle of 45 degrees to the junction—that is midway between the two surfaces—so that the steam will be carried off from both without trouble.

We note in your sketch of the gating employed that you use two sets of gates from the runner to the casting. One gate carries metal into the casting and the other carries metal from the casting into the riser. We believe that you can save some metal and get better feeding by eliminating the first gate. Have the metal from the runner enter the riser, and from the riser gate into the casting. That will keep hot metal in the riser.

Pay Careful Attention To Pouring Operation

Q.—We are sending for your consideration a bronze firehose nozzle or playpipe containing several defects on the interior which only appeared after machining. Can you tell the cause of those?

A.—The largest defect on the interior surface partially covered by a thin shell of metal undoubtedly is the result of some oxide or dross carried into the mold during pouring. Removal of that shell and inspection under a magnifying glass show the surface which is not machined to be of a whitish color and wrinkled. The surface of the metal is bright and clean.

The other smaller holes may be caused by the same difficulty or possibly from gas absorption. We suggest that you watch the skimming operation closely—seeing that a clean lip is maintained on the crucible. Possibly you might be able to trap some of the oxide and dross by using a strainer core or skim gate in the pouring system. Use of one of the numerous proprietary fluxes might be given consideration.

Distinguishes Between Gas and Shrinkage

Q.—Do you know of any procedure whereby a definite distinction can be made on whether porosity in an aluminum alloy is caused by shrinkage or by gas?

A.—According to an article by H. A. Sloman which appeared in the *Journal* of the Institute of Metals (Great Britain) in July, 1945 on vacuum-fusion method for determining gases in metals, it is possible to determine whether porosity in aluminum is due to gas or shrinkage. He points out that it is not always possible to make that determination by microscopical methods, nor can density determinations do other than indicate whether or not the metal is sound. In the particular topic under discussion Sloman used one alloy which was melted under two different conditions and poured into casts. Compositions were the same, and the structures when microetched appeared very similar. Densities were identical, but determinations of the gas contents of the two specimens showed that one contained 0.8 ml. of hydrogen per 100 g. while the other contained only 0.05 ml. per 100 g. Hence, the unsoundness of the first was due to gas (hydrogen) while the second was due to shrinkage.

Has Trouble With Dirt Around the Gate

Q.—We are having trouble with a basin trap weighing about 3 lb which is shaped like a bottle. Diameter is 3 in. with a partition through the center. Metal is 1/8-in. thick and is 85-5-5-5 alloy. Trouble is dirt around the gate. Two castings are made in a mold with the runner between and tipped about 1 in. Runner is in cope and gate in drag. Two gates enter each casting at the sides, and they are 1/4-in. thick and 1 in. wide. Pouring temperature is 2350 F and the sprue is 1¼ in. diameter.

A.—Without a specimen to determine for ourselves what you mean by dirt around the gate we can only suggest possible causes since the term dirt is one of those employed in the foundry which means all things to all men. In other words the dirt may be sand left in the mold or washed from the face, etc., or it may be slag dross or oxide carried into the mold, or developed from the action of hot metal on a wet spot in the sprue or runner.

Hence, the first consideration is to decide which of the two materials is the culprit, and then determine where it comes from. If it is sand, it may arise as previously mentioned, from lack of cleanliness in blowing out the mold before closing. Again the sand may be somewhat weak in bond, and tend to be washed out of place by the stream of molten metal in the runner. Possibly there is too much crush allowed on the joints of the molds, and the edges of the cavity are broken off in closing. Sometimes in cutting the sprue hole the operator does not press down the sand at the top and bottom leaving some disturbed sand around the edges of the hole which is broken off or washed away by the molten metal stream.

If the dirt in the gate is slag, dross or oxide, it indicates the more attention will have to be paid to skimming before pouring, and to see that the lip of the pouring ladle is kept clean. It might be pointed out that one source of dross is a damp pouring ladle or pot sometimes encountered when the metal is melted in a large unit and distributed to the mold in smaller ladles. In such cases see that the pouring ladles are heated sufficiently to dry them all the way through. Oxide or dross also may be created by moist or wet spots in the sprue opening and gating system. Those also may result in sand being cut away and carried into the casting.

Several methods are available for trapping slag, dirt, etc. which are being carried by the metal stream. Simplest is the extension of the runner an inch or two beyond the gate entrances to form a pocket. Principle is that the first rush of metal carrying the undesired materials goes into the pocket and then backs up, leaving the dirt, etc. in the pocket. Other procedure is to use a skimmer core in the runner just before it opens into the gates.

Aluminum Castings Have Defective Areas

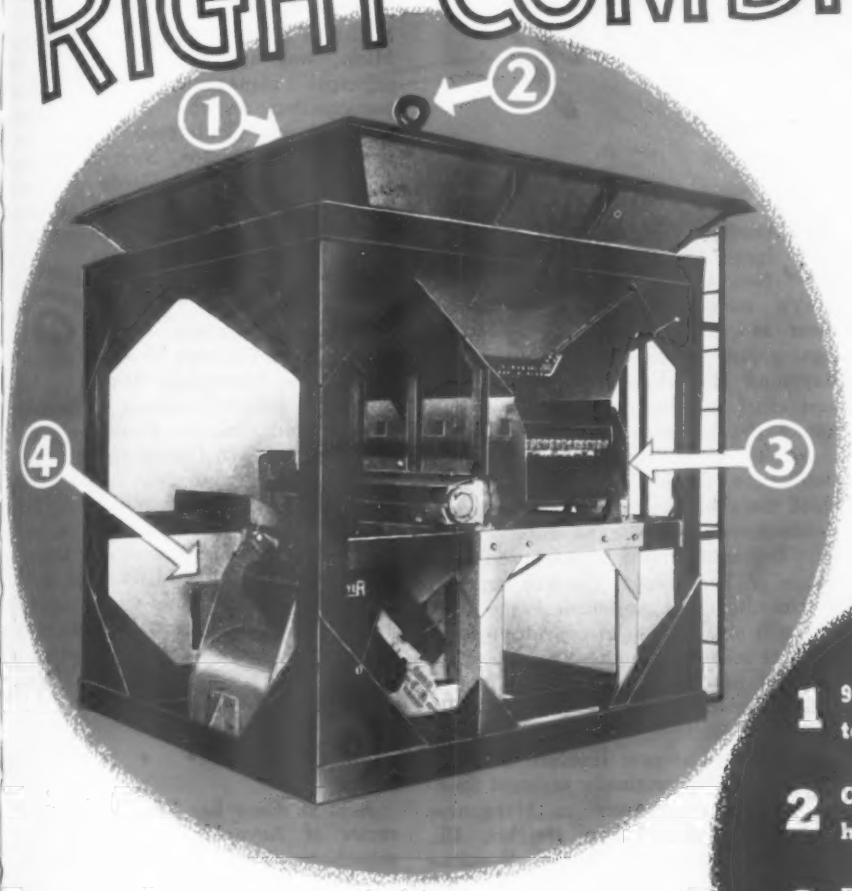
Q.—In our light gray iron foundry we make some aluminum castings. The light, thin castings are defective on account of missruns and cold shuts. Is there any material we can add to the aluminum to increase the flowability?

A.—So far as we know there is no magic elixir which can be added to aluminum to make the molten metal flow more readily. Your problem is to provide metal that will remain in a liquid condition until the mold is filled. Obviously the first factor is to melt the metal at maximum temperature consistent with safety. The second factor is to arrange the gates and runners in a manner that will deliver the metal to the mold by the shortest journey and in the shortest possible time

While bottom gating is advisable for many castings, it may have to be discarded in other instances in favor of top gating. Without a sketch or description of your casting, we cannot suggest a suitable gating system. However, a close study of the design and a realization of the speed at which aluminum solidifies no doubt will suggest a gating system to you that will prevent missruns and coldshuts. Standard practice includes hot metal, ample gates and rapid pouring. Possibly the use of one of the numerous fluxes for aluminum alloys may be of value in overcoming your trouble. Names of manufacturers can be found in the advertising pages, and to obtain the best results, their directions on use of the fluxes should be carefully followed in all details.

RIGHT COMBINATION *for*

SCRAP REMOVAL and SAND CONDITIONING!



1. 9′ x 9′ hopper for capacity of 40 to 50 tons of sand per hour.
2. Center eye bolt facilitates handling by crane.
3. Royer Scrap Remover discharges refuse at the side.
4. Model "NR" Royer provides "Six Point" Sand Conditioning.

THE ROYER COMBINATION SCRAP REMOVER AND SAND CONDITIONER

No greater opportunity for substantial labor savings is available to medium and large sized jobbing foundries than that provided by the Royer Combination. This unit, operated by one man, removes scrap and properly conditions sand in a single, fast operation, reducing costs up to 51% or more. Savings quickly pay for the Royer Combination.

Used sand is loaded into the hopper and fed into a Royer Scrap Remover, where scrap, gaggers, burned cores and other contamination are eliminated. The sand drops into a Royer Sand Separator and Blender, where it is given that thorough Royer "Six Point" sand conditioning—final refuse removal, blending and mixing, even moisture distribution, increased permeability and double aeration.

No pits or foundations are needed for the Royer Combination, which can be moved by crane from bay to bay.

The Royer Combination Model "RC" pictured has a capacity of 40 to 50 tons of sand per hour. Model "NDC" delivers 20 to 25 tons per hour.

You can be forever free of labor shortages which slow down sand preparation and effect important money savings with a Royer Combination. Write for full information.

MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.
KINGSTON, PENNSYLVANIA

MEN of Industry

EARNSHAW COOK

EARNSHAW COOK, chief metallurgist, American Brake Shoe Co., New York, and head of the company's metallurgical research department and experimental foundry, is resigning Jan. 1 and will be succeeded by **Raymond H. Schaefer,** currently assistant chief metallurgist. Mr. Cook, who joined the company in 1933 after 10 years of metallurgical experience at Bethlehem Steel Co., was appointed chief metallurgist in 1939. A native of Reisterstown, Md., he attended Princeton University and Massachusetts Institute of Technology. He will continue as consultant for American Brake Shoe and will also engage in consulting work on steel mill and foundry problems. Mr. Schaefer joined American Brake Shoe in 1940, after 6 years as metallurgist at International Nickel Co. following his graduation from Carnegie Institute of Technology. He was originally assistant foundry metallurgist, American Manganese Steel Division, Chicago Heights, Ill., and was transferred to the American Brake Shoe laboratory in Mahwah, N. J., in 1943 as assistant chief metallurgist.

RAYMOND H. SCHAEFER

♦ ♦ ♦

Max Robbins has been appointed general manager, Federated Metals Division, American Smelting & Refining Co., with headquarters in the home office, New York. Since he joined Federated in 1936, Mr. Robbins has held successively the positions of manager of the Chicago plant, manager at Whiting, Ind., and general manager of the midwestern department consisting of the Whiting, St. Louis, Detroit and Pittsburgh branches.

♦ ♦ ♦

Otto A. Seyferth, president, West Michigan Steel Foundry Co., Muskegon, Mich., was appointed one of the 18 principal management representatives participating in the National Labor-Management Conference which convened in Washington, Nov. 5. **William J. Grede,** president, Grede Foundries Inc., Milwaukee, was named an alternate representative at the conference.

♦ ♦ ♦

William E. Carver, recently chief engineer of the Foundry Division, Reynolds Metals Co., Springfield, Mass., has been appointed general manager of the newly incorporated Amory Permanent Mold Co., Boston. Mr. Carver spent 13 years in aluminum permanent mold casting work with Bohn Aluminum & Brass Corp., Detroit, and 5 years as chief permanent mold engineer at Monarch Aluminum Mfg. Co., Cleveland, before joining Reynolds Metals Co. a year ago. He is an active member of the Committee on Permanent Mold Castings of the Aluminum and Magnesium Division, American Foundrymen's Association.

♦ ♦ ♦

Reid B. Gray has been appointed director of Reynolds Research Institute, subsidiary of the Reynolds Metals Co., Louisville. Mr. Gray, who succeeds **Dr. Warren J. Mead,** head of the geology department, Massachusetts Institute of Technology, will have charge of research in Glen Cove, Long Island, N. Y., and Richmond, Va. Dr. Mead has headed company research since last December, with Mr. Gray as associate, and will continue as consultant. Prior to joining Reynolds in 1944, Mr. Gray was associated with Glenn L. Martin Co., Baltimore, for 25 years. **J. Edward Spike,** until recently with Lever Bros., Cambridge, Mass., and **Carl B. Hamlin,**

(*Continued on page* 122)

MAX ROBBINS

WILLIAM J. GREDE

OTTO A. SEYFERTH

Woodward wishes all its Foundry Friends the Best of All

New Years

We at Woodward take the opportunity of this, the final month of 1945, to send a cordial word of greeting to our good friends in the foundry trade and voice again our deep appreciation of their confidence and good-will.

During this abnormal period of peak demand for pig iron, the friendly, helpful cooperation of our customers has contributed in very large measure to the maintenance of our service on uniform Woodward iron. For this we are sincerely grateful.

As another year approaches, we look forward to continuation of our close and pleasant association with our foundry friends and wish for each and all an abundance of prosperity

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1883

GENERAL SALES OFFICES: 1515 First National Building • Birmingham, Alabama • Phone 4-6786

(*Continued from page* 120)

formerly with the Armstrong Cork Co., Lancaster, Pa., and the Glenn L. Martin Co., will be stationed at the Glen Cove laboratories, as associates of Mr. Gray.

♦ ♦ ♦

Martin S. Burg, for the last three years chief chemist, Dodge Chicago Plant Chicago, has been appointed chief chemist and technical foundry adviser of the Certified Core Oil & Mfg. Co., Division of the Socony-Vacuum Oil Co., Chicago, in charge of the company's laboratory. A graduate of the University of Michigan in 1932, Mr. Burg spent a number of years with Chrysler Corp. as metallurgist in iron and steel as well as oil chemist.

♦ ♦ ♦

J. A. Armstrong has been appointed district manager of sales and engineering service, the Syntron Co., Homer City, Pa., for the state of Michigan, excluding Detroit metropolitan area, with headquarters in Lansing, Mich. Mr. Armstrong who has had wide experience in machinery and equipment design and installation work will supervise the sale and service of vibratory material handling equipment, portable electric tools and gasoline hammers.

♦ ♦ ♦

William E. Hoffman has been appointed sales engineer for the Oiless Core Binder Co., Cleveland. Mr. Hoffman had been general foundry superintendent, the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., for the last 16 years. Prior to that he was with Union Steel Castings, Pittsburgh, for 11 years, and with Scullin Steel Co., St. Louis, for 3 years. He was also associated for a short time with American Locomotive Co., Chester, Pa.

♦ ♦ ♦

Charles H. Morse III has been elected vice president, Fairbanks, Morse & Co., in charge of research patents, traffic, the company's western pump division, and the Inland Utilities Co., subsidiary of the company. Mr. Morse entered the Three Rivers, Mich., plant of the company following his discharge after 2 years of World War I service. He remained there 7 years learning production, and subsequently worked in the electric motor plant, in the St. Paul sales department, the scale factory in St. Johnsbury, Vt., and was promoted to manager of the Memphis sub-branch, later going to the diesel engine department in Kansas City. In 1935 he was elected president of the Inland Utilities Co., and since then has for a brief period served as assistant general manager of the company's Beloit Works.

♦ ♦ ♦

A. P. De Vita has joined the equipment sales staff, Robins Conveyors Inc., Passaic, N. J., where he will specialize in foundry shakeouts. For the last 10 years Mr. De Vita has been general foreman of foundry maintenance and engineering for all plants of Wright Aeronautical Corp., in the Paterson, N. J., area, supervising all foundry operations including laboratory functions, plant layout, installation of equipment, operation and maintenance. As part of the company's educational program he taught the mechanical class on sandblasting, conveyors and shakeouts.

♦ ♦ ♦

Frank Davis, formerly tool supervisor at Allison plant of Carboloy Co. Inc., Detroit, has been appointed manager of the new cutting tool department of the company, and **George Cartwright,** until recently a service man at Allison, has been named service engineer.

♦ ♦ ♦

Charles A. H. Knapp, until recently chief metallurgist, Jenkin Bros., Bridgeport, Conn., has joined the technical staff of R. Lavin & Son Inc., Chicago, as metallurgist and research engineer. **Robert M. Moore** and **George de Laval** have been appointed sales representatives for the latter in the Pittsburgh region.

♦ ♦ ♦

Lt. William A. Meissner Jr., has been appointed director of sales, Silverstein & Pinsof Inc., Chicago. Lieutenant Meissner, who recently was released from the Navy, had charge of sales for Farnan Brass Works, Cleveland, prior to the war. In 1942 he was called to Washington as chief of the foundry production section, Copper Division, War Production Board, and for the last two years has been officer in charge of the Copper Section, Bureau of Ships, Washington. He will relieve Milton Silverstein, president of the company, who has been in charge of sales.

♦ ♦ ♦

Leonard C. Fisher, until recently with the Washington sales office of the Aluminum Co. of America, has been appointed assistant to the product manager of the company's sand and permanent mold casting department, Cleveland, succeeding **Frank D. Goll,** who becomes sales manager of the Alumium Steel Co., subsidiary of Alcoa in New Kensington, Pa.

♦ ♦ ♦

R. E. Pauling has been named manager of the Tulsa, Okla., office of Ilg Electric Ventilating Co., Chicago. He was recently with the sales department of Illinois Malleable Iron Co., Chicago. **Marion A. Elliotte,** formerly with the Marine Products Co., has been appointed to Ilg's Detroit office staff. Mr. Elliotte at one time was plant manager, Detroit Brass & Malleable Works, Wyandotte, Mich.

♦ ♦ ♦

R. N. Landreth has been appointed assistant to the vice president of the general machinery division, Allis-Chal-

(*Concluded on page* 126)

MARTIN S. BURG

J. A. ARMSTRONG

WILLIAM E. HOFFMAN

THE LAST DROP IS AS GOOD AS THE FIRST

Ask the Men Who Use It!

WHAT DO YOU EXPECT OUT OF A SUIT ?

Most men's clothes look smart when they first buy them...the test comes after a few weeks of wear! It's the same with Core Oils; they all look good at first, but DAYTON OILS keep up the faithful, steady uniform performance as long as you use them. The unvarying quality and dependability of these better oils is your assurance of enduring good results.

The DAYTON OIL COMPANY

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AIRLESS ABRASIVE BLAST CLEANING

AMERICAN

WHEELABRATOR

solve the most difficult

THE AIRLESS WHEELABRATOR

The remarkable development of abrasive blast cleaning to its present high standard of efficiency can be directly traced to the invention of the airless Wheelabrator, which employs controlled centrifugal force instead of compressed air. The Wheelabrator will throw more abrasive and throw it harder—per horsepower expended—than any other blasting device ever conceived. Units are available in a range of eight sizes for all applications.

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One of the most important factors in efficient cleaning is the complete utilization of the abrasive blast stream. This is accomplished in the Wheelabrator by perfect directional control of the blast through the time-tested elements of the Wheelabrator mechanism. By a simple adjustment of the control cage, the blast may be directed to any position to utilize the maximum efficiency of the Wheelabrator.

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No matter how special your cleaning problem may seem, there's a quick, easy step you can take toward solving it. The experience of American's problem-solving engineers, gained through many years of successful contact with all types of metal cleaning applications, is available without obligation to you. Our experienced metal cleaning engineers combine their "know-how" skill on every job.

LABORATORY TESTING

We invite you to make use of American's demonstration room and testing laboratory in working out the practical answers to your cleaning problems. Built and equipped at a cost of nearly a quarter of a million dollars, it is the largest and most complete department of its kind in the blast cleaning industry. No matter what your problem is, you'll find the answer here.

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American

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WORLD'S LARGEST BUILDERS OF

SPECIAL CABINETS

cleaning problems

Occasionally when work to be cleaned is of unusual size, shape or weight, or when special production requirements prevail, a standard machine may not be suitable for the application. In such cases a special machine is the economical and efficient answer to the problem. *American* has made a specialty of designing special machines, and has repeatedly demonstrated its ability to solve the most difficult cleaning problems.

Special Wheelabrator Cabinets are designed to completely expose the work to the blast of one or more Wheelabrator units so that all areas to be reached by the blast stream are perfectly cleaned.

The success of *American* special designs and the preference accorded them by the trade is due to these two important factors: (1) our designing engineers are able to draw upon a rich fund of practical metal cleaning experience by reason of their having dealt with practically every type of cleaning problem; (2) the design of the machine is preceded by thorough studies of the cleaning problem, both at the customer's plant and in our factory testing laboratory.

By so doing, every important design factor can be accurately checked in advance, such as: the position of the Wheelabrator unit in relation to the work; the size and speed of the Wheelabrator; the method of conveying the work through the blast stream to obtain proper exposure of all areas; the duration of exposure; etc. When the answers to these problems are obtained the work of the designing engineer is greatly simplified.

When you have a perplexing or difficult cleaning problem bring it to *American*. Our engineers will be glad to give you the benefit of their recommendations without the slightest obligation to you.

Call the

WHEELABRATOR MAN

There is a Wheelabrator representative near you who is ready to help you with your cleaning problems. Call him whenever the need arises.

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BUFFALO, NEW YORK
Charles F. Ludwig, Stuyvesant Hotel. Phone: Grant 8020

CHICAGO 26, ILLINOIS
E. A. Rich & Son, 1737 Howard St.
Phone: Briargate 4416

CLEVELAND 6, OHIO
J. D. Alexander, Wade Park Manor, Corner E. 107 St. and Park Lane. Phone: Cedar 3300

DETROIT 2, MICHIGAN
Robert L. Orth and G. R. Bryant, 7310 Woodward Ave.
Phone: Madison 6800

HOUSTON, TEXAS
J. F. Underway, Lamar Annex Hotel. Phone: Fairfax 7311

LONGMEADOW 6, MASS.
C. L. Benham, 441 Longmeadow St., Phone: Springfield 4-5461

LOS ANGELES 21, CALIF.
Grant & Company, 2144 E. Seventh St., Phone: VA 1461

MILWAUKEE, WISCONSIN
A. H. Freeman

MISHAWAKA, INDIANA
V. S. Spears, 505 S. Byrkit St.
Phone: 5-2144

NEWARK 4, N. J.
David Logan, 242 Broad Street Apartments
Phone: Humboldt 21661

OAKLAND 8, CALIFORNIA
Pacific Graphite Works
40th and Linden Sts.
Phone: Piedmont 3300

PHILADELPHIA 31, PA.
F. W. Pedrotty, 911 Wynnewood Road. Phone: Trinity 2062

PIQUA, OHIO
Russell Duer, 1612 Broadway
Phone: 534

PORTLAND 9, OREGON
Miller & Zehrung Chemical Co., 2201 N. W. 20th Ave.
Phone: Broadway 1171

ST. LOUIS, MISSOURI
Donald E. Matthews, Coronado Hotel. Phone: Jefferson 7700

SEATTLE 4, WASHINGTON
Carl F. Miller & Co., 1217 Sixth Ave., South. Phone: Main 4330

SPOKANE 8, WASHINGTON
Carl F. Miller & Co., South 121 Madison St. Phone: Main 1644

FOUNDRY EQUIPMENT CO.

MISHAWAKA, INDIANA

LESS BLAST EQUIPMENT

THE FOUNDRY IS A GOOD PLACE TO WORK

(*Concluded from page* 122)

mers Mfg. Co., Milwaukee, with headquarters in Washington. Mr. Landreth was associated with the American Brown-Boveri Electric Corp. when it was acquired by Allis-Chalmers in 1931, and joined the latter organization to serve in the Milwaukee sales office and the electrical department. In 1934 he was transferred to Washington, and was district manager. He was appointed special representative for the company in 1944.

♦ ♦ ♦

C. C. Hottman has been appointed sales engineer, Detroit Steel Casting Co., Detroit, succeeding **E. H. Frederick,** who died recently. Mr. Hottman has been associated with the Farrell-Cheek Steel Co., Sandusky, O., for the last 21 years as assistant to the sales manager, sales engineer, and in charge of advertising during most of that time. In his new appointment he will service accounts of Detroit Steel Casting Co. in Ohio and Indiana.

♦ ♦ ♦

Thomas F. Davis, until recently chief metallurgist of the Philadelphia Works, General Electric Co., has been appointed district manager of the new sales office recently opened in New York by the Beryllium Corp. of Pennsylvania, Reading, Pa. Mr. Davis, a graduate of Brown University, was associated with General Electric Co. the last 7 years.

♦ ♦ ♦

John M. Parks has joined the staff of the American Society for Metals as editor of technical books and assistant in the work of the Educational Committee in the preparation of lectures for use by the society's local chapter groups. Dr. Parks holds degrees from Purdue University and Rensselaer Polytechnic Institute, and recently had been engaged in teaching and research at the latter school.

♦ ♦ ♦

John B. Rood, formerly general superintendent, the Western Machinery Co., Portland, Oreg., has joined the sales and engineering staff of the Pacific Steel Foundry Co., Portland. Mr. Rood, well known in the foundry industry, at one time was associated with Smith & Watson Iron Works, which was engaged in forge, foundry work and shipbuilding during World War I.

♦ ♦ ♦

Dr. Howard Doolittle, until recently associated with Radiation Laboratories, National Defense Research Committee, has joined the engineering staff of Machlett Laboratories, Springdale and Norwalk, Conn. Dr. Doolittle will be in charge of all phases of high frequency research and development and will also be available for consultation with equipment manufacturers engaged in this field. A graduate of Trinity College, he obtained his Ph.D from University of Chicago.

♦ ♦ ♦

Paul Eisenhuth and **J. Newton Hall,** until recently with the Chemicals Division, War Production Board, and **Arthur H. Carnes,** for the last 20 years division sales manager, the Stanco Distributing Co., subsidiary of the Standard Oil Co.

J. NEWTON HALL

ARTHUR H. CARNES

of New Jersey, have joined the sales staff of Velsicol Corp., Chicago. Mr. Eisenhuth will be in charge of aromatic solvents; Mr. Hall will be eastern sales manager; and Mr. Carnes has been appointed district manager for the company in the Middle West.

♦ ♦ ♦

Dr. William A. Mosher, technical assistant to the director of research, Hercules Powder Co., Wilmington, Del., has resigned to accept an appointment as head of the chemistry department, University of Delaware. Dr. Mosher joined the Hercules company in 1940.

♦ ♦ ♦

Paul H. Shaeffer has been appointed Cleveland district manager, Vanadium Corp. of America, with headquarters in the Union Commerce Bldg. office of the Cleveland-Cliffs Iron Co., Cleveland, agents for Vanadium. Mr. Shaeffer's appointment is a new office created to service the Cleveland and Detroit districts of the company.

♦ ♦ ♦

Dr. Miguel Siegel, recently head of the foundry department, Instituto de Pesquisas Technologicas, Sao Paulo Brazil, has become a partner in and technical director of Equipamentos Industrias "Eisa" Ltda., Sao Paulo, Brazil, with offices also in Rio de Janeiro. The company represents a number of foundry equipment manufacturers of the United States.

♦ ♦ ♦

Edward Schlinck has been appointed chief sand engineer, Oberdorfer Foundries Inc., Syracuse, N. Y. For the last 3 years Mr. Schlinck has been sand engineer at the Capital Foundry, Long Island City, N. Y., and prior to that was in the engineering department, Wright Aeronautical Co., Paterson, N. J., for 4 years.

♦ ♦ ♦

Ralph W. Payne has been appointed southern representative of the Pittsburgh Steel Foundry Corp., Glassport, Pa., in the sale of railway specialties, general castings and machine work. His headquarters are in Washington.

♦ ♦ ♦

George H. Tulley has been appointed assistant sales manager of the Metals Refining Co. division of the Glidden Co., Cleveland, with headquarters in Hammond, Ind.

♦ ♦ ♦

Frank St. Vincent, who has been in the operating department of the Vanadium Corp. of America at the Niagara Falls, N. Y., plant, has been appointed sales engineer in the Pittsburgh district.

♦ ♦ ♦

Eugene C. Bauer, president, Kensington Steel Co., Chicago, has been elected a director and vice president of Poor & Co., manufacturers of railway supplies, forgings and malleable iron castings.

♦ ♦ ♦

Edward C. Hoenicke, recently assistant general manager, has been appointed general manager of the Foundry Division, Eaton Mfg. Co., Detroit. He succeeds **J. L. Dostal,** who has resigned.

MODERN HANDLING METHODS

Now a Must!

There's no time to lose in getting operating costs on a competitive peace-time basis. Modern methods of handling are now a *must.* Electric industrial trucks, for example! Palletized loads! And, of course, the newest development in motive power Storage Batteries . . . the sensational Philco "Thirty" that gives 30% longer life! Try Philco "Thirty" in your hardest-working trucks. The tougher the job the better it shows up. Write for the facts today.

The new Philco "Thirty" Industrial Truck Storage Battery, that gives 30% longer life, is identified by its distinctive red connectors.

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EQUIPMENT BUILDERS

Discuss Peacetime Problems

DISCUSSION at the twenty-seventh annual meeting of the Foundry Equipment Manufacturers Association, held at Hot Springs, Va., Oct. 19-20, indicated the production of reconversion equipment for the foundry industry is being delayed by difficulties in securing materials and components, and by labor problems. Emphasis was placed on the need of all industry for fair and adequate labor legislation to meet the present and future problems of the reconversion period.

A forum participated in by all companies represented, revealed that the foundry industry is increasing its purchases of equipment for reconversion purposes. In addition, with foundries turning their attention toward further mechanization of operations in an effort to relieve shortages of labor, numerous equipment producers see a heavy demand for machines for some time to come.

In opening the meeting, Tom Kaveny Jr., Herman Pneumatic Machine Co., and president of the association, outlined the extensive work of the various committees during the past year. He indicated that probably the most serious problems ever to face an industry lie ahead, and urged every member to take an active part in order that the association may better serve the foundry industry as a whole. Arthur J. Tuscany, secretary-treasurer of the association, presented a report which showed the organization in good financial condition. Leicester S. Lewis, Tabor Mfg. Co., Philadelphia, discussed briefly the several possibilities of obtaining price relief from OPA ceiling prices.

Activities of the new Public Relations Committee were outlined by Bruce L. Simpson, National Engineering Co., Chicago, and chairman of the committee. During the year the committee has sponsored a number of talks by Mr. Tuscany before foundry groups on the subjects "Let's Look Ahead at the Foundry Industry," and "The Foundry Equipment Industry and Educational Institutions." Mr. Tuscany discussed briefly the material included in both of these talks.

Mr. Simpson reported the committee had developed a new insignia for the association which now is being used by many members in advertising and on stationery. The committee also has conducted an extensive survey of foundries in educational institutions. This report, indicating a definite need for foundry equipment, has been presented to the Surplus Property Administration with the thought that it may aid in the disposal of some surplus foundry equipment to such educational institutions. The survey, which was presented in the October issue of THE FOUNDRY in an article, "The Foundry Industry and Educational Institutions," by Arthur J. Tuscany, shows the foundry and the foundry equipment industries need to do a better job in helping educational institutions prepare men for future careers in foundries.

Surplus War Property Small

A report of the Foundry Equipment Industry Committee on Surplus War Property was presented by its chairman, Harry T. Worthington, Beardsley & Piper Co., Chicago. While this committee has been recognized on an overall industry basis to help the RFC in any problems pertaining to the disposal of surplus foundry equipment, the total amount of such equipment thus far declared surplus has been small. Latest figures of the RFC indicate that the value of foundry equipment thus far declared surplus is $2,220,000, of which $643,000 has been sold, leaving a backlog or $1,577,000, which is only a small percentage of total DPC purchases during the war. Mr. Worthington reported that the Clayton formula is being used in establishing prices on all standard equipment.

William W. Maloney, secretary, American Foundrymen's Association, Chicago, outlined plans for the Golden Jubilee convention and exhibition of the AFA which will be held in Cleveland May 6 to 10, 1946. Mr. Maloney predicted that this will be one of the best attended and most valuable foundry shows ever staged under AFA sponsorship, and will offer the equipment industry an opportunity to show the foundry industry the newer developments in production machinery.

The following were elected to the board of directors: Tom Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh; E. J. Burnell, Link-Belt Co., Chicago, and Harry T. Worthington, Beardsley & Piper Co., Chicago. At a meeting of the board, the following officers were re-elected for the coming year: President, Tom Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh; vice president, Otto Pfaff, American Foundry Equipment Co., Mishawaka, Ind.; secretary - treasurer, Arthur J. Tuscany, Cleveland.

Mr. Kaveny announced that the association was establishing product groups in the following classifications: Dust control; molding machines; abrasive cleaning; sand handling; and blast cleaning. Acting chairmen have been appointed to organize the groups.

Bulletins Discuss Foreman's Role

American Management Association, 330 West 42nd St., New York 18, has available some informative literature pertaining to the foreman and his role in industry. Research Report Number Seven, "The Development of Foremen in Management," discusses status of responsibilities, compensation aspects, job security, management conferences and relationship with superiors, among other topics. A small leaflet, Production Series Number 154 entitled "Management and the Foreman," deals with unionization, attitudes, incentives and the foreman's status in management.

THOMAS KAVENY JR.

OTTO A. PFAFF

ARTHUR J. TUSCANY

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MOLY

Around DETROIT

BY A. H. ALLEN
Detroit Editor, The Foundry

Molding sand committee abandons conference table for foundry floor . . . Suppliers of automotive gray iron castings are squeezed between price ceilings and labor costs

ONE of the few examples of an association committee abandoning the usual technique—sitting around a conference table and burning up endless cigarettes in the course of protracted discussions—in favor of rolling up sleeves, donning coveralls and actually getting out in the foundry to do some work, is the case of the AFA Subcommittee on Iron Foundry Molding Sands at Elevated Temperatures. The third meeting of this group was held last month, Nov. 6-9, at the University of Michigan's foundry in Ann Arbor, and it proved a signal success.

The unique activity was under direction of Harry W. Dietert who divided his 15-man committee into two groups, each of which spent two days working in the foundry. Accompanying illustration shows one group at work during the meeting. Personnel includes D. E. Cutler, J. A. Gitzen, C. H. Lorig, H. G. McMurry, H. N. Meyers, W. Spindler, L. B. Thomas, G. F. Watson, E. W. Olsen, H. Rees, E. C. Zirzow, Arnold Satz, J. Schumacher, John Grennan, D. C. Williams, and of course Mr. Dietert.

Messrs. Spindler and Grennan are on the teaching staff of the university, but the others come from a broad cross section of foundry activity and not all in the immediate area. Considerable credit devolves upon Mr. Dietert in persuading busy men of this type to take two days' time to devote to committee-in-the shop work.

First meeting of this molding sand committee was of an organizational nature and was held at the Rackham Memorial in Detroit, but the succeeding two meetings were held in the foundry at Ann Arbor, as will be the fourth meeting now scheduled for next March. At the gathering last month, Mr. Watson of American Brake Shoe & Foundry was chosen vice chairman of the committee, and Prof. Spindler secretary.

Specific problem tackled at the latest meeting was the correlation between shakeout effort on castings and laboratory data on retained strength of molding sands. Five different core mixes were used and castings poured from electric furnace iron. Various cooling rates from, say, 30 minutes, up to several hours were used and a comparative measure taken of the various shakeout efforts entailed. Test samples were in the form of 40-lb cylinders 8 in. high and 6 in. inside diameter. One group had ¼-in. wall thickness and the other ½-in. About 75 castings in all were poured, all at 2600 F. After allowing to cool, they were shaken out on a jolt machine, and the time required to knock out cores noted. This varied from a few seconds to as much as 1500 seconds.

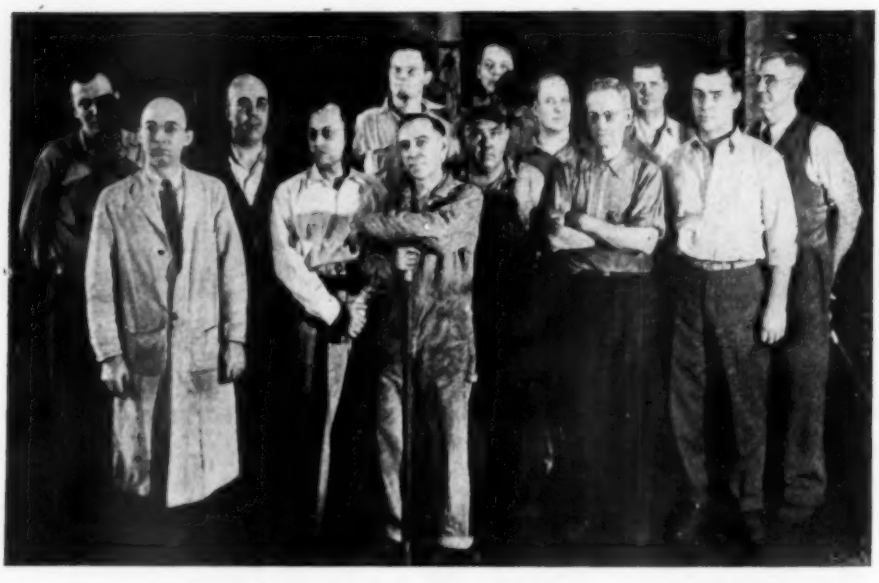
A wide variety of factors effecting shakeout effort was observed, many of them not generally recognized. They include fineness of core sand, pouring temperature, time core is in the casting, type of binder used, amount of clay in the mixture, amount of oxygen in the core, as well as time and temperature of core baking. By correlation of data resulting from the experiments, it is hoped to gain a clearer conception of steps necessary to assure the minimum of effort in knocking out cores consistent with maintaining quality of casting. In the long run, such information can prove of definite practical value to the foundryman.

• • •

SUPPLIERS of automotive gray iron castings in the current "period of reconfusion" are finding themselves neatly squeezed between price ceilings on the one hand and about a 40 per cent increase in labor costs on the other. Despite the higher wages being paid, it is practically impossible to recruit sufficient labor to handle anywhere near the volume of business now on books, with the result production in many cases is approximating only 10 per cent of the tonnage turned out four years ago. In such a situation, casting buyers are forced to do a tremendous lot of shopping around. Where a couple of sources may have been able to handle requirements in 1941, it is now necessary to develop possibly 15 or 20 sources, and even then shortages are serious and unending. Hudson assemblies, for example, had to be stopped a couple of weeks ago because of failure of cylinder blocks to come through from a foundry source.

The case of Campbell Wyant & Cannon in Muskegon is typical. This company books business from nearly all the principal automobile manufacturers and currently is reported operating at 10-15 per cent of capacity. The payroll totals 650, compared with normal of

(*Concluded on page* 132)



This group of capable-looking foundrymen consists largely of members of the AFA Subcommittee on Physical Properties of Gray Iron Molding Sands at Elevated Temperatures who selected the University of Michigan foundry as the site for their recent committee meeting. Left to right: E. C. Zirzow, W. A. Spindler, Day E. Cutler, H. W. Dietert, Robert Doelman, G. F. Watson, Louis Ruffins, D. C. Williams, E. W. Olsen, Bert Sheldon, William Seese, H. G. McMurry and John Grennan

Mathews

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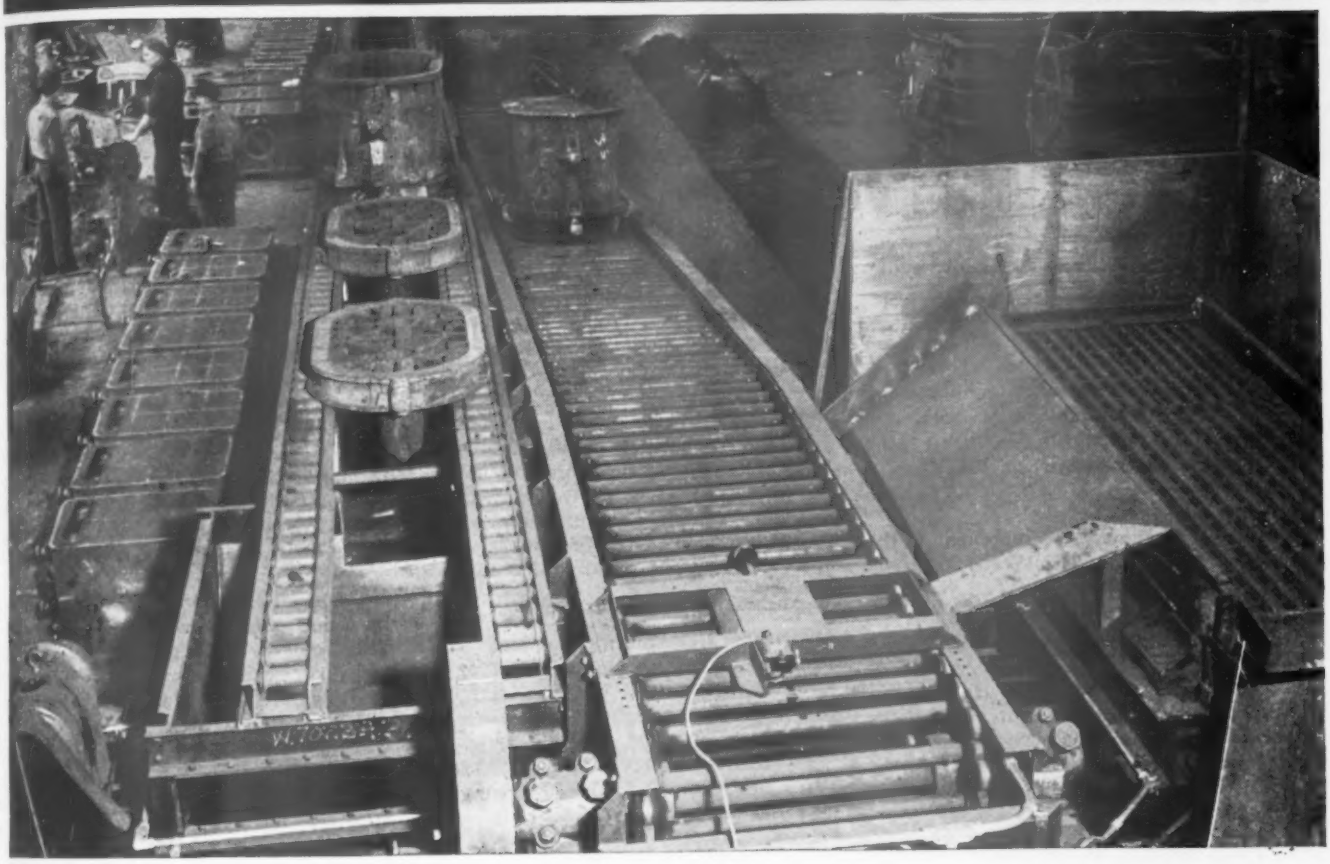


For heavy-duty work, such as illustrated above, where power conveyers are required, the pallet type Chain Conveyer is one of the most practical. It is capable of handling very heavy loads at carefully controlled speeds. The many different types of pallets available add to the flexibility of conveyers of this type. They can be of steel or wood, and can be spaced at various intervals in the chain, or can be interlocking. There is a Mathews Engineer operating in your vicinity. Ask him about Mathews Chain Conveyers, and the many other types of Mathews Foundry Conveyers which have been engineered to serve production

Mathews Conveyer Company

ELLWOOD CITY, PENNSYLVANIA

(*Concluded from page* 130)

3000 and a wartime peak of 5000 C-W-C officials say they are not hiring any more workmen until a definite announcement comes from the government on a firm wage-price policy; but unfortunately the government's policy seems to be to have no policy, leaving individual companies to work out of their own wage price dilemmas as best they can. With prices frozen, wage costs up as already indicated, and unions asking for 30 per cent more, foundries would seem to be at an impasse.

Time may be the ultimate answer. It has a way of healing wounds and smoothing over difficulties. Right now the outlook is particularly black but as civilian production gradually inches its way back to normal, there will be answers to the wage-price mess. After all, working people cannot live very handsomely on unemployment compensation payments, price controls some day will have to be lifted, strikes eventually wear themselves out. There appears no alternative at the moment other than waiting out the situation.

• • •

SEVERAL new gray iron foundries of the smaller variety are in the planning or early construction stages hereabouts. They are of the job shop type, handling smaller sizes of castings in modest tonnages. Among them are shops planned by Brunette Machine Co., Ferndale; Transmission & Gear Co. in Dearborn, and Clinton Machine Co., Clinton, Mich.

Wilson Foundry & Machine Co. in Pontiac, handling castings requirements of Willys-Overland in Toledo, as well as a variety of other jobs, is attempting to accelerate operations, taking steps toward instituting a second shift last month. The company is backing several projects outside the strictly foundry field. One is a small 2½ hp motor to drive bicycles and to be distributed by the Whizzer Motors interests in California.

This little unit, which fits inside the frame of a bicycle and drives the rear wheel through a belt, is of unusual design. Basically, it has a permanent mold cast aluminum crankcase, with a single finned cylinder cast in gray iron. Flywheel is die cast zinc, with alnico magnet insert to form a magneto. Piston is forged aluminum, crankshaft and camshaft are forged SAE 3120 steel. Valves are of the poppet type. Only two controls are needed, one for the throttle and one for a clutch to disengage the drive. They are actuated through cables attached to levers on the two handgrips.

Another of the Wilson postwar projects is an aluminum garage door of the self-actuating type. This is still in the preliminary stages.

Industry BRIEFS

SEPTEMBER sales of foundry equipment represented 577.2 per cent of the 1937-1939 monthly average, according to the Foundry Equipment Manufacturers Association. This compares with 532.2 per cent in August and 388 per cent in September, 1944, and with the exception of March was the highest monthly figure for this year to date.

• • •

Scully Machinery & Equipment Corp., formerly located at 2031 West 74th street, Chicago, has moved to 77 West Washington Blvd., Chicago 2. Company is a dealer in used foundry and industrial equipment.

• • •

Sterling Foundry Co., Hovey and Park Sts., Muskegon Heights, Mich., has been incorporated with $50,000 capital to manufacture brass, bronze and aluminum castings, by Ernest Smith, 620 Hoyt St.

• • •

Great Western Foundry Inc., Leavenworth, Kans., has been incorporated with $1000 capital to operate a foundry for the manufacture of metal and plastic castings.

• • •

Mine Safety Appliances Co., Pittsburgh, plans construction of a six-story plant, to cost over $65,000.

• • •

Kausel Foundry, 1726 Broadway, Minneapolis has let contract to Charles Schleich for a one-story foundry addition, 60 x 100 ft.

• • •

Cheney Foundry, 1118 South Third St., Minneapolis, plans construction of a one-story foundry addition, 30 x 52 ft.

• • •

Berlenbach Foundry Co., Shelly, Pa., plans construction of three projects for expansion, including an addition to its gray iron foundry of 58 x 100 ft, erection of a fireproof pattern storage building and concrete sand storage sheds, and an addition to the nonferrous foundry of 40 x 60 ft.

• • •

Quality Foundry Co., Stockton, Iowa, has been incorporated with $6000 capital by John A. Atkins, president and treasurer, and Bernal Montgomery, vice president and secretary.

• • •

Velsicol Corp., Chicago, has opened a general sales office at 408 Boulevard Bldg., Detroit, for distribution of aromatic solvents, core oils, hydrocarbon resins and insecticides manufactured by the company. Gus J. Mayer has been appointed in charge of sales in this territory.

• • •

Mechanical Foundries Co. plans construction of a new foundry building at 4545 Pacific Blvd., Vernon, Calif., to cost $45,000.

• • •

Precision Castings Co. Inc., 12600 Berea Rd., Cleveland, plans construction, of a one-story plant addition, estimated to cost $210,000.

• • •

Framingham Pattern Works, Mellen St., Framingham, Mass. plans construction of a two-story plant building, 80 x 121 ft, to cost approximately $40,000.

• • •

Lone Star Steel Co., Daingerfield, Tex., plans for expansion of steel plant, including gray iron foundry, at total cost of approximately $2,500,000.

• • •

Newport News Foundry & Steel Works Inc., Newport News, Va., has been incorporated with $25,000 capital, to do a general foundry, steel fabricating and manufacturing business, Charles A. Parker is president.

• • •

George Adler Brass Foundry, Cleveland, plans construction of four buildings, including a foundry 60 x 125 ft, core and pattern building 40 x 125 ft, furnace room 40 x 40 ft, and office building 36 x 40 ft, to cost about $50,000.

• • •

Carboloy Co. Inc., Detroit, has appointed Samuel Harris & Co., Chicago, as its authorized distributor of carbide tipped cutting tools in northern and central Illinois, northern Indiana, southern Wisconsin, southwestern Michigan and the eastern portion of Iowa along the Mississippi river.

• • •

Union Brass & Copper Co., Ashland, O., has been incorporated with $25,000 capital to manufacture brass castings and plumbing goods, by Jack Jacobson, of Union Malleable Mfg. Co., Clark Ave., Ashland.

• • •

Centru Cast Corp., Peru, Ind., has been incorporated with 1100 shares of $100 value to manufacture steel castings and do a general wholesale business, by S. H. Arnolt, N. D. Walker, C. C. Bunyan and associates.

• • •

Grinnell College, Grinnell, Iowa, has let contract to Pittsburgh-Des Moines Steel Co. for structural steel for a one-story foundry, 80 x 300 ft, to be leased and operated by Lennox Furnace Co., Marshalltown, Iowa.

• • •

Mir-O-Col Alloy Co., Florence District, Los Angeles, plans construction of a new foundry at 2438 East 53rd St., 59 x 240 ft, to cost $33,000.

• • •

Solar Precision Castings Inc., New York, recently purchased as a subsidiary by Solar Aircraft Co., San Diego, Calif., from B. F. Hirsch Inc., New York, has been removed to Des Moines, Iowa.

• • •

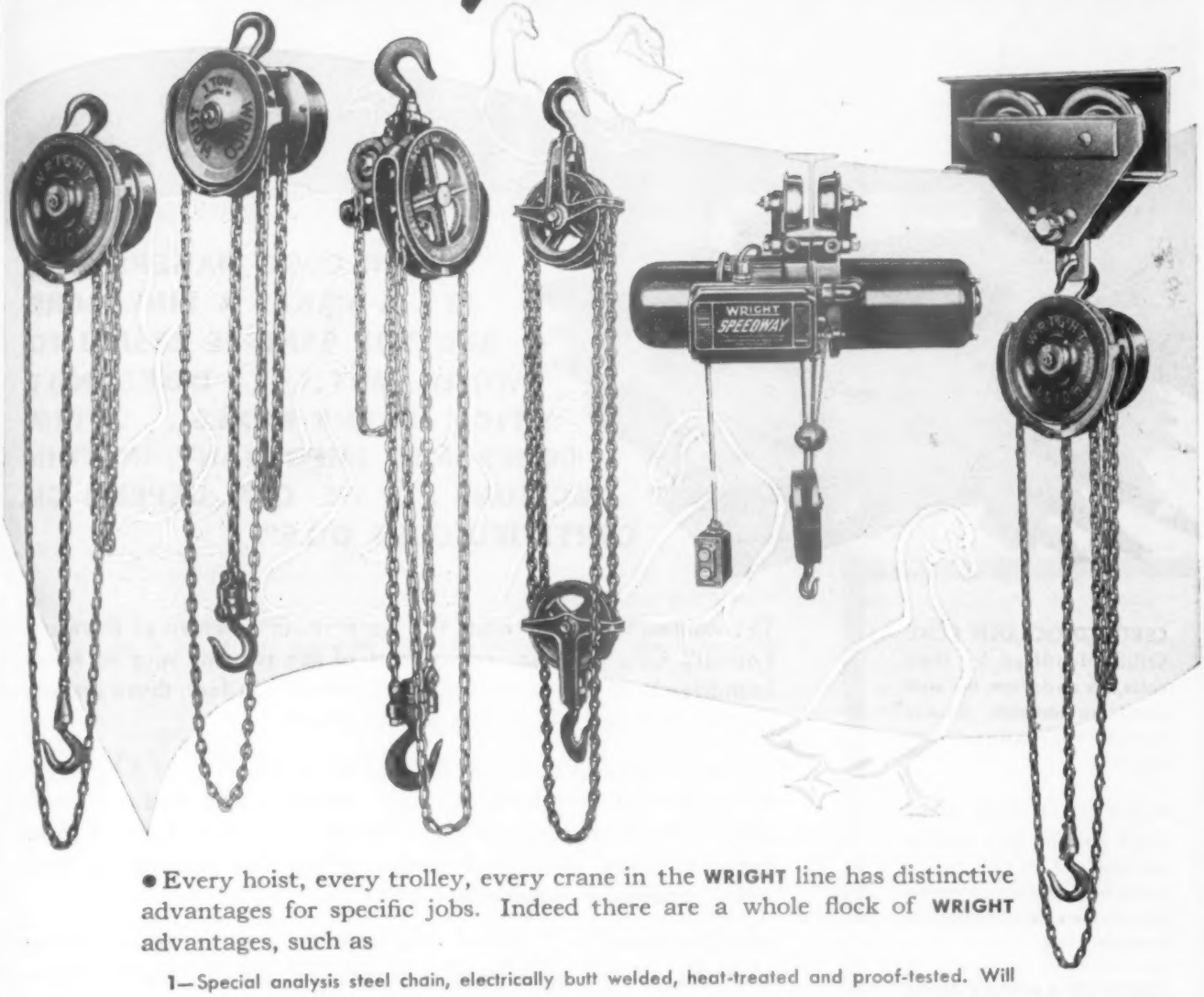
Ohio Foundry Co., Cleveland, plans construction of a one and two-story warehouse addition at 9608 Quincy Ave., to cost $10,200.

• • •

W. E. Warner & Sons, Algonac, Mich., have let contract for a one-story brass foundry, to cost about $100,000.

THE WRIGHT LINE

HAS A WHOLE *Flock* OF ADVANTAGES!



• Every hoist, every trolley, every crane in the **WRIGHT** line has distinctive advantages for specific jobs. Indeed there are a whole flock of **WRIGHT** advantages, such as

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3—Non-fouling chain guide permits pulling of hand chain from any angle below hoist.
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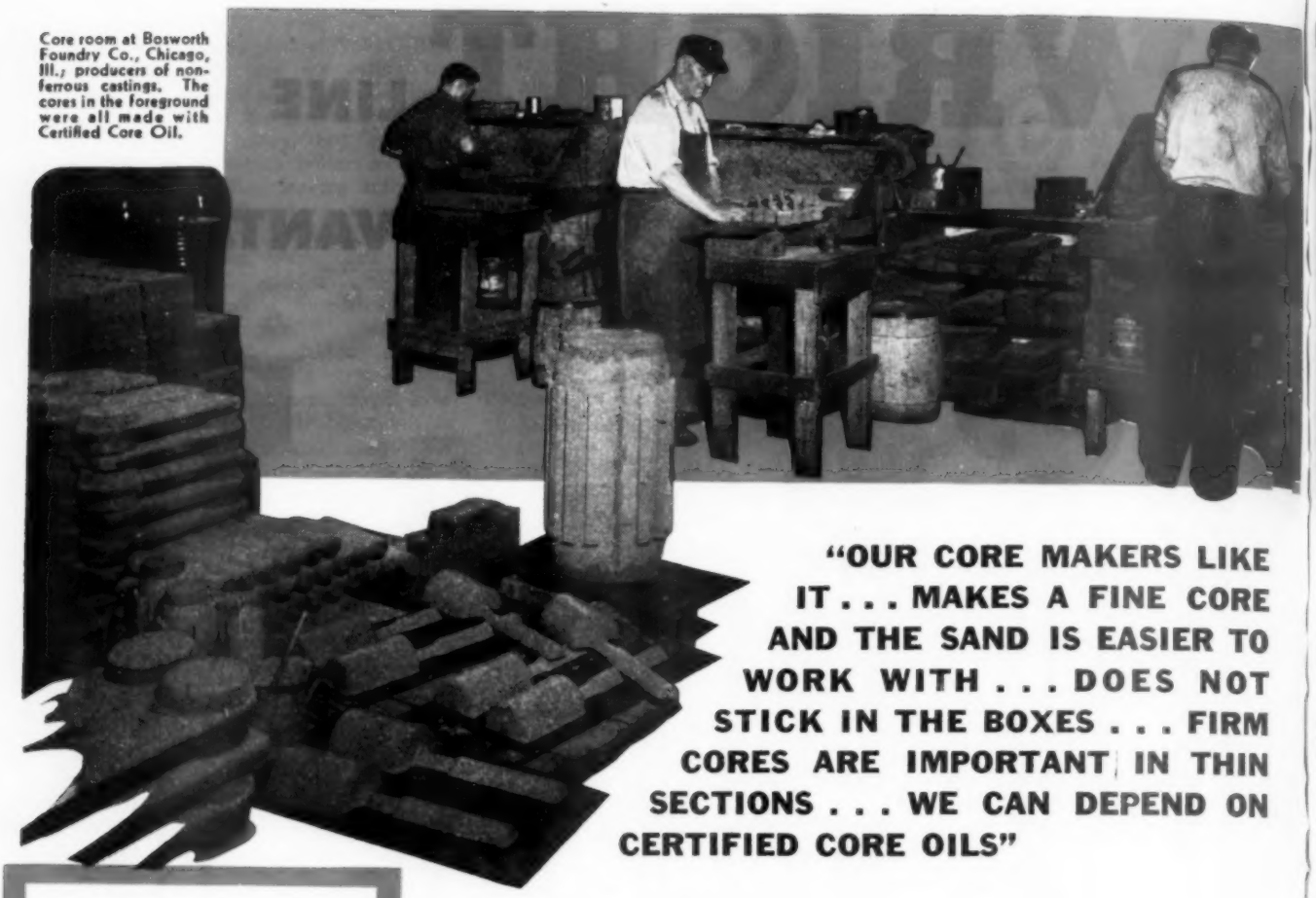

Core room at Bosworth Foundry Co., Chicago, Ill.; producers of non-ferrous castings. The cores in the foreground were all made with Certified Core Oil.

"OUR CORE MAKERS LIKE IT . . . MAKES A FINE CORE AND THE SAND IS EASIER TO WORK WITH . . . DOES NOT STICK IN THE BOXES . . . FIRM CORES ARE IMPORTANT IN THIN SECTIONS . . . WE CAN DEPEND ON CERTIFIED CORE OILS"

CERTIFIED GOLDEN CORE OILS, identified by their color, are made from the most select raw materials. Usually termed "conventional core oils."

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CERTIFIED RAPIDRY CORE OILS are new core oils, also dark in color and considerably lower in price. They bake quicker in the oven or at a lower temperature and provide more readily collapsible cores.

The comments above from the core room foreman at Bosworth Foundry Co., Chicago, cover most of the reasons why so many foundries have adopted Certified Core Oil; in fact, these remarks just about make a complete advertisement.

We need only to add that the use of Certified Core Oil results in minimum baking time and easy shakeout, and that it is available in the three general types listed at the left. Each of these types is made in several grades of binding strength to meet every operating requirement.

All Certified Core Oils are sold with the distinct understanding that the quality must be as represented, be of strictly uniform quality and give complete satisfaction -- or be returned for full credit. Place a trial order on this basis.

Just give us the grade and number of the core oil you use; whether it is golden or dark in color; the type and mesh of your sand; and a brief general description of your oven conditions.

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NEW OFFICERS, DIRECTORS OF THE GRAY IRON FOUNDERS' SOCIETY

HOMER BRITTON
Treasurer

G. H. ALTEN
Vice President

H. L. EDINGER
President

H. A. STOCKWELL
Secretary

OFFICERS elected at the recent annual convention of the Gray Iron Founders' Society to head that organization for 1945-46 include: President, H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J.; vice president, George H. Alten, Alten's Foundry & Machine Works, Lancaster, O.; secretary, Howard A. Stockwell, Barbour Stockwell Co., Cambridge, Mass.; treasurer, Homer Britton, Cleveland Foundry Co., Cleveland.

The following were named directors to serve 3 years: C. R. McGrail, Texaloy Foundry Co., San Antonio, Tex.; Edward C. Hoenicke, Eaton Mfg. Co., Detroit; J. O. Jackson, Jackson Industries Inc., Birmingham; Arthur R. Enquist, Connecticut Foundry Co., Rocky Hill, Conn.; Charles T. Milles, C. H. Milles Foundry Co., Chicago; Edward B. Smith, American Brake Shoe Co., New York.

H. L. Edinger, president of the Barnett Foundry & Machine Co., Irvington, N. J., has been associated with that company since 1909. After working in all departments for a number of years, he was appointed sales manager in 1928. Three years later he was elected vice president, an office which he held for 13 years until he was named president of the company in 1944. Mr. Edinger is a past president of the New Jersey Foundrymen's Association and is now a member of its board of directors. He is also chairman of the Gray Iron Industry Advisory Committee to the Office of Price Administration. Vice president of the Gray Iron Founders' Society for the last 2 years, Mr. Edinger also was a member of the cost committee of the society during that period, serving as committee chairman last year.

George H. Alten, owner of Alten's Foundry & Machine Works, Lancaster, O., assumed control of the business in 1911, at the death of his father who founded the original machine shop in 1889. In 1905 the elder Alten, with his two younger brothers, who were molders by trade, developed the foundry division of the organization. Mr. Alten attributes the success of the business to his close contact with his father during his early years, when he worked after school, week-ends, holidays and vacations, assimilating knowledge which has resulted in the growth of the company from a small shop to the present buildings and storage areas covering more than 25 acres of ground.

Howard A. Stockwell is treasurer of Barbour Stockwell Co., Cambridge, Mass. A member of the Administrative Council, National Founders Association, Mr. Stockwell is also on the Gray Iron Foundry Industry Advisory Committee to the War Production Board. At the annual meeting of the Gray Iron Founders' Society in 1944, Mr. Stockwell was named a director for 3 years.

Homer Britton, vice president, Cleveland Foundry Co., the foundry division of Cleveland Co-Operative Stove Co., Cleveland, has been associated with the organization for 32 years. He joined the latter as general office clerk, and subsequently became timekeeper and later assistant foundry manager. In 1919, when Cleveland Co-Operative built a new foundry, Mr. Britton was made foundry manager. He was elected vice president and general foundry manager in 1939.

C. R. McGrail received his metallurgical education at Carnegie Institute of Technology, and for a time was with the foundry department of Fairbanks, Morse & Co., at Three Rivers, Mich., later serving as plant metallurgist there. Mr. McGrail then became foreman of the Chevrolet Gray Iron Foundry, Saginaw, Mich., leaving there to go with the foundry division of the Struthers-Wells Titusville Corp., Warren, Pa. In 1931 he joined Steel Sales Corp., Chi-

C. R. McGRAIL

E. C. HOENICKE

J. O. JACKSON

A. R. ENQUIST

C. T. MILLES

E. B. SMITH

cago, as metallurgist, and in 1939 he became manager of the nickel and ferroalloys department of that company. Since June, 1944, Mr. McGrail has been president of the Texaloy Foundry Co., San Antonio, Tex.

Edward C. Hoenicke entered the foundry industry in 1916, when he began a manufacturing apprenticeship in foundry operation, patternmaking and machine tool construction with the Oliver Machinery Co., Grand Rapids, Mich. For 12 years he held various positions with companies engaged in foundry operation, and in 1928 he left the Oakland Motor Car Division, General Motors Corp., where he was foundry advisor, to become sales engineer with the Holley Permanent Mold Machine Co. Inc. When this company merged with the Erb-Joyce Foundry Co., to become the Eaton-Erb Foundry Co., Mr. Hoenicke became sales manager and later was made vice president. He was apppointed assistant to the general manager of the Foundry Division when Eaton-Erb Foundry Co. became the Foundry Division, Eaton Mfg. Co., and last month was promoted to general manager. Mr. Hoenicke was the first head of the Gray Iron Castings Section, War Production Board, and has served as a member of the Gray Iron Foundry Industry Advisory Committee to WPB. Active in the AFA, Mr. Hoenicke currently is chairman of the association's Detroit Chapter.

J. O. Jackson entered business in Indianapolis at an early age as a structural engineer and salesman for a large machinery manufacturer. He soon ventured into business for himself, operating a wholesale heating supply company in Indianapolis. In 1931 Mr. Jackson became executive vice president of American Casting Co., Birmingham, later becoming president. In 1944 he acquired all the properties of the company and changed its name to Jackson Industries Inc. This company, originally a small producer of cast iron culvert pipe, has been developed into one of the larger industrial plants of the Birmingham district, operating a modern gray iron foundry and a machine division.

Arthur R. Enquist, a native of Branford, Conn., has been engaged in the foundry business for 42 years, his experience including malleable and brass founding as well as gray iron. At present he is secretary of the Connecticut Foundry Co., Rocky Hill, Conn., a company he, with two associates, organized in 1919.

Charles T. Milles is president and one of the founders of the C. H. Milles Foundry Co., Chicago. Mr. Milles has been associated with the company for 33 years and was vice president until 1937, when he became its head. Recently he has been directing activity of the wage negotiations committee of the Chicago Foundrymen's Association.

Edward B. Smith has spent his entire business life with American Brake Shoe Co., New York. When the company was organized in 1902 he was transferred from the sales department of Ramapo Iron Works, which was acquired by the company, and appointed secretary to the vice president and general manager of the parent company. He spent some time in iron and steel foundries and was a brake shoe salesman with a large railroad territory in the Central East, Cuba, and in the export trade, later taking on sales of other iron castings. In 1929 Mr. Smith was made assistant vice president of the company . Seven years later he was appointed receiver and manager of Eastern Steel Castings, Newark, N. J., acquired by Brake Shoe and sold to American Steel Foundries. In 1937 he assumed his present position of vice president of the Brake Shoe & Castings Division, devoting his time to managing castings sales of all division plants.

GRAY IRON FOUNDERS' CONFERENCE

(*Continued from page* 96)

City, Mich., and Howard A. Stockwell, Barbour Stockwell Co., Cambridge, Mass. Mr. Nicholas pointed out that sound cost control provides the answer not only to economic stability in the industry, but also contributes to the workers' security and to protection of the stockholders' investment. He stressed the need for creation of wealth producing job, and stated that one of the nation's difficulties is that it has accumulated too much overhead in relation to its capacity for producing wealth.

Mr. Wickson stated that the first approach to successful costing is to break all costs down to at least the four major departments in the foundry—coremaking, molding, melting and cleaning—and to establish costs for direct and indirect labor, supplies, a portion of variable expenses and a portion of fixed expenses. The greater the accuracy in distributing these costs in each department, the more successful the cost system will be.

Mr. Stockwell described the experiences of a group of New England foundries in establishing a uniform system of cost control.

Activities of the Army Industrial College were discussed by Col. Walter Jeager, who urged the appointment of a gray iron industry advisory committee to assist the armed forces in readying the nation's productive capacity during peacetime for mobilization in time of emergency. Such committees, being organized in various industries, are intended to perpetuate the recent wartime teamwork between industry and the armed forces and to provide the latter with knowledge regarding industrial development of both a scientific and managerial nature that would affect industrial mobilization.

C. W. Schwenn, Brillion Iron Works, Brillion, Wis., addressing Gray Iron Founders' conference. At left, Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; at right, H. L. Edinger, society president-elect

Presentation of awards in appreciation for distinguished service to the government and the gray iron foundry industry in wartime featured one of the luncheon sessions. Recipients, all of whom at one time had been associated with the War Production Board at Washington, were: E. P. Buchanan, Pittsburgh Coke & Iron Co., Pittsburgh; Frank G. Steinebach, THE FOUNDRY, Cleveland; Don J. Reese, International Nickel Co., New York; A. Douglas Hannah, WPB; Edward C. Hoenicke, Eaton Mfg. Co., Detroit, and William Kerber, Hanna Furnace Corp., Buffalo.

Speaking at the same session, Lt. Col. John Lansdale Jr. discussed "The Nation's Best Kept Secret—the Atomic Bomb." Colonel Lansdale formerly was chief of foreign and domestic intelligence and counter intelligence for the Manhattan Project.

In a panel session devoted to industrial relations, E. M. Cushing, supervisor, labor relations, United States Rubber Co., New York, stressed the need for placing the responsibility of handling such mat-

(*Continued on page* 138)

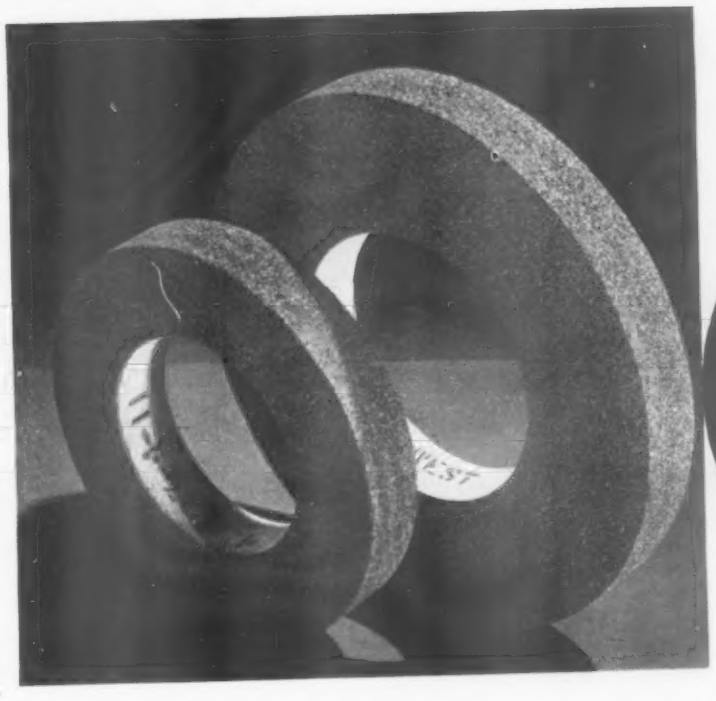
One sure way to clean up cleaning room problems is to equip your cleaning room with Mid-West Abrasives.

The products of the Mid-West Abrasive Company — snagging wheels, disks, cones and other foundry type abrasives —are especially designed and manufactured for the production demands of today.

Performance is the yardstick you use to measure the quality of the abrasive you buy. Apply that yardstick to Mid-West products, and you'll find your cleaning problems solved.

Switch to Mid-West today!

CLEAN UP WITH MID-WEST ABRASIVES



MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

OWOSSO, MICH. • DETROIT

ROCHESTER, PA.

(*Continued from page* 136)

ters in the hands of a capable individual. The industrial relations department should work closely with the plant's foreman, and the latter should become accustomed to looking to that department for guidance, he stated. Likewise, foreman should be consulted in the drawing up of new labor contracts, because they must live with such contracts, and they should become thoroughly acquainted with all of the provisions of the agreements made with labor. A common-sense approach to industrial relations problems is infinitely preferably to national legislation on the subject, he added.

Facts supporting the contention that the foundry need not, and in many cases is not, regarded as an undesirable place in which to work were offered by Dr. James E. Mullen, Toledo, O. He remarked that a personal observation of the number of back strains in foundries and in a war ordnance depot over a 2-year period shows that the comparison was 6.6 per cent in the foundries against 11 per cent in the ordnance depot, which was not considered "hot, heavy or dirty." A similar comparison of toe and foot injuries over the same period and in the same companies showed 6.1 per cent for the foundries and 20 per cent for the ordnance depot.

"If the foundry industry maintains its high standards of mechanical safety, encourages cleanliness and adopts physical examination both pre-employment and regularly during employment then the expression "hot, heavy and dirty" will be changed to "hot, heavy and healthy."

Personnel policies followed by the International Harvester Co., Chicago, were explained by Eric E. Schwantes, director of training at the company's McCormick

(*Concluded on page* 140)

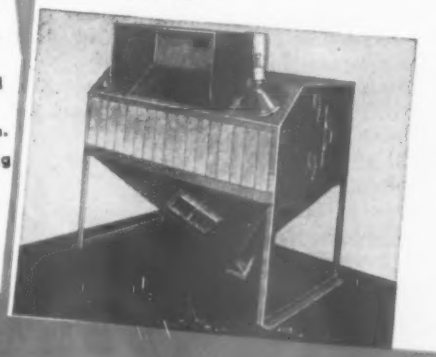
Top row of scenes at Gray Iron Founders' conference shows, left to right: Eric E. Schwantes, International Harvester Co., Chicago; H. L. Edinger; W. W. Rose, executive vice president; Dr. James E. Mullen, Toledo, O.; Frank O'Malley, the Ferro Machine & Foundry Co., Cleveland. Views of luncheon and technical sessions shown in other panels

For Cleaning *Faster, Better* and at *Lower Cost*
Choose from the SLY Complete Line of Foundry Cleaning Equipment

SLY TUMBLING MILLS

1. Heavy forged steel trunnions, extra heavy roller bearings.
2. Special door locks — easily operated.
3. Extra heavy gearhead motor.
4. Integral motor platform.
5. Loading and unloading from either side.

SLY BLAST CABINETS



1. Two lights mounted at front to illuminate castings.
2. Operator's eyes shielded by protective hood.
3. Easy loading and unloading of castings.
4. Used for thorough cleaning of small and intricate parts, or as an auxiliary to larger units.

SLY BLAST ROOMS

1. Overall down-draft ventilation.
2. Ample illumination.
3. Lined throughout with 3-16" wear plates.
4. Floor of grating and perforated plates.

SLY AIRLESS BLAST CLEANING EQUIPMENT

MILLS AND TABLES

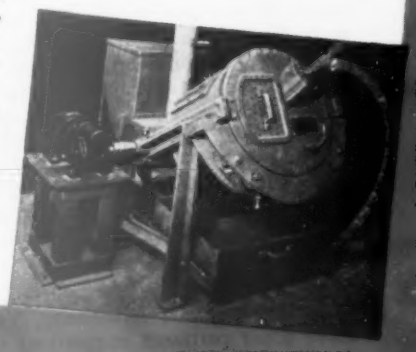
Exclusive wheel features for fast and economical cleaning.

SLY DUST FILTERS

1. More filter cloth—hence greater filtering capacity.
2. Filter bags under tension (patented) insure: (a) minimum resistance to air flow, and (b) complete dust removal.
3. Simpler shaker mechanism—less moving parts, less maintenance.
4. Bags more easily replaced.
5. Automatic control — any degree.

SLY BLAST MILLS

1. Handles quantities of castings, forgings, stampings, hardened steel parts.
2. Tilted barrel with rolling action.
3. Convex perforated bottom plate forms bottom of barrel.
4. Work is constantly turned bringing bottom pieces to top.
5. Stationary head of barrel has large door for loading.



70 YEARS OF SERVICE TO THE FOUNDRY INDUSTRY

THE W. W. SLY MANUFACTURING CO.

4753 TRAIN AVENUE ★ CLEVELAND, OHIO

(*Concluded from page 138*)

Works. The four most important phases of the personnel program are: 1. Proper selection and placement of employees; 2. Proper induction program; 3. On-the-job, vestibule and apprentice training; 4. Service to employees. Mr. Schwantes pointed out that just as all of the ingredients of a core sand mixture are necessary to success of the final product, so each of the steps taken by the company is important in developing an efficient and satisfied worker.

Practical suggestions on the re-employment of war veterans were offered in a paper by Frank O'Malley, personnel director, Ferro Machine & Foundry Co., Cleveland. Mr. O'Malley recommended that management designate a capable individual as counsel for returning men, and that he be familiar with the rights of veterans and keep in touch with legal developments affecting them. If a former worker is returning, full information on his old job should be compiled beforehand, but in the interest of placing him most effectively the company should ascertain what skills he has acquired in service. In the case of men who have suffered injuries Mr. O'Malley suggested analyzing requirements of the plant's various jobs to determine which ones can be filled satisfactorily by partially incapacitated workers.

Responsibility Rests With Management

Speaking at one session devoted to factors affecting quality, volume and cost of production, J. E. Linabury, foundry engineer, General Motors Corp., Detroit, stated that no one department establishes the quality of castings, although the responsibility for it rests with management. However, the casting salesman, the patternmaker, the material buyer, the metallurgist and the operating departments all share this responsibility. In addition, the customer also has his responsibility in his design and specifications. Mr. Linabury elaborated on various factors affecting quality of the final product. The more important of his recommendations were: Sell only those products the foundry is capable of making; reach an agreement with the buyer on proper design; have good pattern and equipment control, and adequate fixtures and gages; select the right materials and use them in correct amounts and in proper condition; watch the making, venting and baking of cores; learn the customer's requirements as regards cleaning and grinding of castings. In conclusion, Mr. Linabury indicated that although material, equipment and workmanship all enter into establishment of product quality, workmanship remains the most influential factor.

Max Kuniansky, vice president, Lynchburg Foundry Co., Lynchburg, Va., offered some pertinent suggestions on reducing costs through production controls. He pointed out that the cheapest way to do a job is the best way one knows how, but that frequently a method is followed merely because of habit, thereby constituting what he termed a "heredity" problem. Just because the war is over, foundries should not expect a marked improvement in quality of available workers, Mr. Kuniansky warned. In this connection he stated that some foundries may find it necessary to install labor saving devices, even if no cost reductions are effected. As means of offsetting rising labor costs, however, the speaker recommended proper training of workers and adoption of an intelligent, well-engineered wage incentive system. The latter plan, he added, should reward the indirect as well as the direct worker.

Mr. Kuniansky detailed the more important changes in operating practice adopted recently by Lynchburg Foundry Co. Present practice includes use of synthetic sand, balanced blast cupola with moisture control, careful weighing

of cupola charges, chill testing of each ladle, use of inoculants, and desulphurizing.

Ways of increasing production while reducing costs and improving working conditions in the small foundry were suggested in a paper on "Plant Conditioning" by C. W. Schwenn, general foundry superintendent, Brillion Iron Works Inc., Brillion, Wis. While a clean, orderly plant—both inside and out—will assist in attracting a higher grade of worker, tangible savings through increased production, better quality of product, reduced labor turnover, and lower accident rate also will result, he asserted.

Describing some of the improvements made in his plant the last few years, Mr. Schwenn mentioned that a bad dust and gas condition in the foundry and coreroom was eliminated by installing eight 42-in. ventilators costing about $400 each. The improved ventilation, he stated, was reflected in a reduction of 4 man-hours of work per ton of good castings in the molding department. A homemade hydraulic slag disposal system, installed at a cost of $300, eliminated the hard job of cleaning up slag, improved working conditions of the cupola tender and charging crew, and saved 3½ man-hours per day.

Other labor-saving equipment acquired, including a high lift truck tractor, small power shovel and portable shakeout, also assisted in raising the daily tonnage from 40 tons to 55 with an accompanying total reduction of 8 man-hours per ton of good castings and a substantial cut in scrap castings and machine shop rejects.

Speaking at a luncheon session, Dr. David D. Henry, president, Wayne University, Detroit, outlined three steps he considers necessary for the foundry industry to take if it is to compete successfully for the services of the young engineers of tomorrow. Briefly, these are:

1. Assist educators, vocational counselors, and all others in a position to influence the thinking of young men vocationally, to understand that there is an opportunity for engineers to enter the foundry business at the level of engineering work.

2. Develop a program of interpretation which will clearly and effectively present the professional opportunities in foundry engineering.

3. Make it possible for schools and colleges to present a laboratory to students which is modern in every detail and represents not only the best foundry practice as now found, but also some of the improvements in foundry practice to which the profession aspires.

Attract Young Men to Foundry

The conference concluded with the society's annual business meeting, at which various committee reports were presented. J. M. Price, Ferro Machine & Foundry Co., Cleveland, reporting for the Committee on Education, stated that the group is co-operating with the Steel Founders' Society of America and the Malleable Founders' Society in a porgram having as its ultimate aim the interesting of young men in the foundry industry.

H. L. Edinger, chairman of the Gray Iron Industry Advisory Committe to the OPA, and other members of that committee discussed the various amendments made to MPR-244, the regulation covering maximum prices of gray iron castings, as well as other matters relating to price control.

Report of the cost committee, of which Mr. Edinger also is chairman, indicated widespread interest in the society's recently issued cost manual and recommended universal adoption of its provisions in the interest of more effective control over manufacturing expenses.

Plant Capacity Is Increased

Machlett Laboratories Inc., Springdale and Norwalk, Conn., manufacturer of x-ray tubes, high voltage rectifiers and electron tubes, is expanding its Springdale plant. The building program, scheduled for completion about Dec. 1, will approximately double the size of the plant and supply an additional 40,000 sq ft of floor space.

—and that's not the only thing radiography did for this foundry

The foundry was doing almost everything that could be done to produce sound castings. But, even with well planned quality controls, 225 tons—25% of 900 tons of shell castings for electric motors—produced annually were being rejected.

What was worse, machining worth $82 per casting was being wasted. Internal irregularities, revealed during machining, were causing rejection . . . a direct loss of $50,000 a year.

The foundry turned to x-ray—solved the problem of finding internal flaws *before* machining, saving the $50,000.

Important as this saving was, it was only the beginning. The foundry also began using radiography to improve its casting technic, increasing its over-all yield of sound castings by one third.

Radiography does other things, too. It shows designers how to reduce weight safely . . . helps engineers specify sound processing technics . . . and guides fabricators to better fabricating methods. Why not get your local x-ray equipment dealer to show you how—now?

TRIAL BY X-RAY—the foundry's dependable way of saving itself trouble, and saving customers' money, by catching internal flaws in castings before shipment.

EASTMAN KODAK COMPANY
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Radiography

ANALYZES . . . INSTRUCTS . . . CORRECTS . . . IMPROVES

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MAN-TO-MAN on the Molder's Bench

By RALPH L. LEE

EXPERIENCE seems to show that "Good Housekeeping" always goes hand in hand with good leadership and good business. To illustrate the opposite, I was telling a group of foundrymen recently of some rather messy foundry offices I had visited on occasion.

The desk of one foundry boss in particular was a diller. On one corner was a toppling stack of recent and ancient magazines shuffled together with pamphlets and catalogs. Next to the stack were several milk bottles at one time containing coffee. Sample cores in various stages of crumbling to sand, some sawed-through sections of out-of-production castings, letters, circulars, bills and records were spread over the rest of the desk until there was hardly enough room to sign a check. Then, on about every other flat surface in the room, including most of the floor and some chairs, were heavy, light and middle-sized castings, samples of core binder, sand, facing, parting and pigs.

About a week after my comments before this foundry group, a likeable, solid looking individual called at my office, introduced himself as the owner of a good-size foundry and said he wanted to tell me how much he enjoyed my talk. In fact, he said he had brought his superintendents along with him to hear me.

"Doc," he said, "when you came to that part where you described that messy foundry office you visited, do you know what happened? Every damn one of my superintendents reared up in his seat and stared at me.

"Well sir, the next morning I got down to my office about an hour early and believe me I went through that place like a dose of salts. When I finished I headed for the superintendents' offices, only to find when I got to each one, that every single one of the boys had beat me to it on their office-cleaning jobs."

My friend (by this time) told me it was surprising how the good-housekeeping idea had taken hold and spread throughout his foundry.

I know when I work in Johnny Cochrane's foundry (Johnny is my foundry-owner friend over in Pennsylvania) he always raises Ned when he finds me trying to lift a cope while teetering on a sand pile I let build up under my feet. Johnny, I believe, was born neat. It just seems that dirt won't stick to him. He hates dirt and disorderliness like poison, so you can go anywhere in his foundry—from the melting room through to the coreroom, shakeout and cleaning room—and find things spick and span. As he says, a place for everything and everything in its place is just good business.

Now, I was not born neat like Johnny but I certainly had good schooling in it at the cash register company where I started out to work as a kid. Just imagine milling machines, profilers and drill presses, all machining gray iron, painted sort of a light apple green and the floors scrubbed white. You could have eaten your lunch anywhere on the foundry and even the screw machine department floors. John H. Patterson, the president, used to preach to all of us that good-housekeeping was not just a matter of convenience and sanitation but it was an outward sign of inward thinking and planning. In other words, good-housekeeping was a way of life and work which reflected itself in employee relations, the product and the balance sheet.

Heavens only knows, I don't want to preach, for I'm sick and tired of hearing it myself, but no one can make me believe dirt belongs in the foundry any more than it does in the office, pattern shop, toolroom, plating room or machine shop.

AFA Plans for 50th Annual Meeting

(*Concluded from page* 101)

plant visitations, reception, banquet arrangements, and the like.

Indications point toward substantial delegations of foundrymen from several of the foreign foundry associations at the 1946 meeting. Formal invitations have been extended by AFA President F. J. Walls, International Nickel Co., Detroit, to foundry groups in England, France, Belgium, South America, Mexico, Australia, China, South Africa, and several other countries of the Allied Nations. Thus the event will have all the colorful aspects of an international foundry congress.

Details on preconvention tours, and reception of foreign delegates at the convention are being worked out in conjunction with the chairman of the AFA Committee on International Relations, F. G. Steinebach, editor of THE FOUNDRY.

As at recent Cleveland foundry conventions, a preview of exhibits probably will be held on Saturday, May 4, for the benefit of local foundry workers. This Northeastern Ohio Day has always drawn great crowds. The convention and exhibits will open officially Monday morning, May 6, lasting through Friday.

During the week the AFA will hold its annual business meeting, at which new officers and directors will be elected, awards presented for achievement, winners of the national apprentice contests announced, and the annual Foundation Lecture presented, this year by Dr. G. H. Clamer, Ajax Metal Co., Philadelphia, a past president of the association. Climaxing the 50th Anniversary meeting will be the annual banquet, to be addressed by a speaker of national importance, not yet announced.

Organizes Foundry Management Firm

E. R. Steinmann & Associates, an organization servicing exclusively the foundry industry on administrative, management and industrial engineering problems, has been established by E. R. Steinmann, with headquarters at 1 DeKalb Ave., Brooklyn, N. Y.

E. R. Steinmann has been connected with the foundry industry in an operating and executive capacity for the past 20 years. During that period of time he has installed industrial and management systems for foundries in the United States, South America and Europe.

Associated with Mr. Steinmann, who is president of the organization, is W. H. Eckelmann, executive vice president, with 25 years of practical foundry experience.

Treasurer and secretary of the organization is W. Stone, who has been associated with several large foundries in an executive capacity for the past 15 years. Chief supervisor is J. J. McCarthy, specialist in job evaluation, wage incentive and control systems for foundries.

Branch offices will be opened in Boston and Chicago, on or about Jan. 1. The Boston office will be in charge of J. J. O'Reilly, who has served the foundry industry for the past 20 years in an executive capacity. P. J. Costello will head the Chicago office.

AROUND THE CLOCK

DAY IN... DAY OUT!

More and more foundries are discovering every day that CROWN HILL SEACOAL FACING does a better job *consistently*. Made from selected, quick-flash, high-volatile coal. Hard spots are eliminated due to low sulphur content. The 2980° F. fusion point of the slight ash residue assures easy peeling. It reduces cleaning costs and combats that foundry "bug-a-boo": a bottleneck in the cleaning department.

THROUGHOUT THE INDUSTRY

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IN TWIN CITIES: The Foundry Supply Co., Inc., 2295 University Ave., St. Paul 4, Minn. IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.

Now that Tungsten high-speed steel can be supplied as needed, manufacturers are returning to it for the well-defined uses in which it surpasses all other materials.

Very rapidly, since Government restrictions began to abate, the volume of Tungsten going for civilian requirements has increased month by month. An informative book, entitled "Tungsten Steels," has been prepared by the Molybdenum Corporation. It deals with both scientific and practical considerations, and recommends procedures that have been found to yield best results. A copy of this publication will be mailed on request. Correspondence is invited concerning any application of Molybdenum, Tungsten, or Boron.

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A GLOSSARY OF TERMS EMPLOYED IN THE FOUNDRY

ABRASIVE—Any substance used for abrading such as grinding, polishing, blasting, etc. Material may be bonded to form wheels, bricks and files, or applied to paper and cloth by means of glue. Natural abrasives include emery, corundum, garnet, sand, etc. Main manufactured abrasives are silicon carbide and aluminum oxide. Metallic shot and grit also are used as abrasives in cleaning castings.

ACETYLENE—A colorless, tasteless gas composed of carbon and hydrogen with the formula C_2H_2, and used for welding and cutting operations in combination with oxygen. It easily is generated by the action of water on calcium carbide.

ACETYLENE GENERATOR—A multi-chamber apparatus containing calcium carbide and water with automatic controls for production of acetylene.

ACID—A chemical term to define a material which gives an acid reaction.

ACID BOTTOM OR LINING (FURNACE)—The inner bottom or lining of a melting furnace composed of materials having an acid reaction. Materials may be sand, siliceous rock or silica brick.

AERATOR—A device for fluffing or decreasing the density of, and cooling sand by the admixture of air.

AFTERCOOLERS, COMPRESSED AIR—A water-cooled heat exchanging unit for extracting excess heat generated in air due to compression.

AIR BELT—Chamber, surrounding the cupola at the tuyeres, to equalize the volume and pressure of the blast and deliver it to the tuyeres.

AIR BOX—See air belt.

AIR CHAMBER—See air belt.

AIR CHANNEL—A groove or hole which carries the vent from a core to the outside of a mold.

AIR COMPRESSOR—Machine to give pressure to air so that it can be employed to operate pneumatic tools and other equipment.

AIR CONDITIONING—While the term applies more specifically to the adjustment of temperature and relative humidity of air to provide the most equable conditions for human comfort, in a broad sense it may apply to such applications as control of moisture in the cupola blast, removal of dust and smoke from the atmosphere, ventilation, etc.

AIR CONTROL EQUIPMENT—Any device used to regulate the volume, pressure or weight of air.

AIRLESS BLAST CLEANING—A process whereby the abrasive material is applied to the object being cleaned by centrifugal force generated by a rotating, vane-type wheel.

AIR DRIED (DRY)—A core or mold dried in air, without application of heat.

AIR FURNACE—A form of reverberatory furnace for melting ferrous and nonferrous metals and alloys. Flame from fuel burning at one end of the hearth passes over the bath to the stack at the opposite end of the furnace.

AIR HAMMER—Chipping hammer operated by compressed air.

AIR HOIST—Lifting device operated by compressed air.

AIR HOLE—Hole in a casting caused by air or gas trapped in the metal during solidification.

ALPHA IRON—An allotropic (polymorphic) form of iron which is magnetic whose atomic structure is body centered cubic lattice. It is soft, ductile, of fair strength, and is capable of dissolving a few hundredths of a per cent carbon to form a solid solution.

ALLOTROPY—Occurrence of an element in two or more modifications. For example, carbon occurs in nature as the hard crystalline diamond; soft flaky crystalline graphite, and amorphous coal.

ALLOY—A metallic material formed by mixing two or more chemical elements. Usually possesses properties different from those of the components.

ALLOYING—Procedure of adding other elements than those usually comprising a metal or alloy to change its characteristics and properties.

ALLOYING ELEMENTS—Elements added to nonferrous and ferrous metals and alloys to change their characteristics and properties.

AMORPHOUS—Having no crystalline form.

ANGLE SLEEKER—Molder's tool for sleeking or smoothing the inside and outside corners of a mold.

ANNEAL—Heating a metal or alloy to a designated temperature and allowing it to cool slowly.

ANNEALING BOX—Metal box or container to protect castings against the furnace atmosphere during annealing or heat treatment.

ANNEALING FURNACE—Furnace where metals or alloys are heated and allowed to cool while they are being annealed.

ANNEALING KILN—See annealing furnace.

ANNEALING PIG IRON—See malleable pig iron.

ANNEALING POT—See annealing box.

ARBOR—A metal barrel, frame or plate to support or carry part of a mold or core.

ARRESTOR, DUST—Equipment for removing dust from air.

ASSEMBLING (ASSEMBLY) LINE—Conveyor system where molds or cores are assembled.

AUSTENITE—A solid solution of cementite or iron carbide, Fe_3C, in iron.

BACKING BOARD—A second bottom board where molds are opened.

BACK DRAFT—Taper or draft which prevents removal of pattern from the mold.

BACKING PLATE—See backing board.

BACK (BACKING) SAND—Sand between the facing sand and the flask.

BAFFLE PLATE—Plate or wall in a firebox or furnace to change direction of the flame.

BAIL—Connection between crane hook and ladle.

BALL DROP—A large ball of iron or steel for breaking scrap iron.

This extensive glossary of foundry terms has been compiled by Edwin Bremer from a wide variety of sources. In the development of this material a great amount of help has been secured from the *Steel Castings Handbook* published by the Steel Founders' Society of America, Cleveland; *American Malleable Iron* published by the Malleable Founders' Society, Cleveland, and from unpublished work of a Committee on Foundry Nomenclature of the American Foundrymen's Association, Chicago. THE FOUNDRY wishes to thank all sources from which this material has been obtained.

THE EDITORS

A GLOSSARY OF TERMS EMPLOYED IN THE FOUNDRY

BALL MILL—A revolving cylinder partly filled with iron balls used to grind or mix sand, or other materials.

BAND, INSIDE—A steel frame placed inside a removable flask to reinforce the sand.

BAND, SNAP FLASK—See jacket, mold.

BAND SAW—A saw in the form of an endless steel belt which runs over pulleys.

BANK SAND—Sand from banks or pits.

BAR—A rib in the cope to help hold the sand.

BASIC—A chemical term for a material which gives an alkaline reaction.

BASIC BOTTOM OR LINING (FURNACE)—Inner lining and bottom of a melting furnace composed of materials having a basic reaction. Materials may be crushed burnt dolomite, magnesite, magnesite brick or basic slag.

BASIN—A cavity on top of the cope into which metal is poured before it enters the sprue.

BASKET—Tray for holding charcoal or coke fire in a mold.

BATCH—Amount or quantity of core or mold sand or other material prepared at one time.

BATH—Molten metal on the hearth of a furnace, in a crucible, or a ladle.

BATTENS—Strips attached to a bottom or follow board.

BAY—Longitudinal division of foundry floor.

BAYBERRY WAX—Wax made from bayberries, used as a coating on patterns.

BEAD—A half-round cavity in a mold, or a half-round projection or molding on a casting.

BED—See bed coke.

BED CHARGE—The charge of iron placed on the coke bed in a cupola.

BED COKE—Coke placed in the cupola well to support the following iron and coke charges.

BED-IN—Method of ramming the drag mold without rolling it over.

BELLOWS (PL.)—A device operated with both hands for producing a current of air.

BELT—A band of leather or other flexible material connecting a set of pulleys.

BENCH—Frame support on which small molds are made.

BENCH MOLDER—Man who makes small molds on a molder's bench.

BENCH RAMMER—A short rammer used by bench molder.

BENTONITE—A widely distributed and peculiar type of clay which is considered to be the result of devitrification and chemical alteration of the glassy particles of volcanic ash or tuff. Used in foundry to bond sand.

BINARY ALLOY—An alloy of two metals.

BINDER—Material to hold the grains of sand together in molds or cores. May be cereal, oil, clay, resin, pitch, etc.

BLACK LEAD—Graphite for facing molds and cores.

BLACK HEART—American type malleable iron. The normal fracture shows a velvety black appearance having a mouse-gray rim.

BLACKING—Carbonaceous material for coating mold or core surfaces.

BLAST CLEANING—Removal of sand or oxide scale from castings by the impinging action of sand, metal shot or grit projected under air, water or centrifugal pressure.

BLAST GATE—Sliding plate in the cupola blast pipe to regulate the flow of air.

BLAST LAMP—A blow torch.

BLAST METER—Instrument indicates the volume or pressure or both, of air passing through the blast pipe.

BLAST PIPE—Pipe for conducting air under pressure. Usually refers to the section between blower or fan and cupola.

BLAST PRESSURE—Pressure of air in blast pipe or wind belt of the cupola depending on location of indicating instrument. Usually given in ounces of water pressure.

BLAST VOLUME METER—See blast meter.

BLEED (BLEEDER, BLEEDING)—Molten metal oozing out of casting stripped or removed from the mold before solidification.

BLIND RISER—An internal riser which does not reach to the exterior of the mold.

BLOW—A casting defect due to trapping of gas in molten or partially molten metal.

BLOW GUN—Valve and nozzle attached to a compressed air line to blow loose sand or dirt from a mold or pattern. Also to apply wet blacking.

BLOW HOLE—The hole or void left in a casting by trapped gas. See blow.

BLOW PIPE—A small pipe or tube through which the breath is blown in removing loose sand from small molds.

BLOW PISTOL—See blow gun.

BLOWER—Machine or device for supplying air under pressure to the melting unit.

BOD, BOTT—A piece of clay or other material to stop the flow of metal from the taphole.

BOD, BOTT STICK—A stick or rod on which the bod is mounted so that it may be forced into the taphole.

BODY CORE—The main core.

BOIL—Agitation of molten metal by steam or gas.

BOND—Cohesive material in sand.

BORINGS—Metal in chip form resulting from machining operations.

BORON—One of the elements whose chemical symbol is B, and atomic weight is 10.82. In the form of borax and boric oxide used as a flux in nonferrous metallurgy, and in form of an alloy with other elements as an addition agent to ferrous alloys.

BORON TRICHLORIDE—A product used for degasification of aluminum alloys.

BOTTOM BOARD—Board supporting the mold.

BOTTOM DOORS—Doors underneath the cupola.

BOTTOM PLATE—Metallic bottom board. Also refers to foundation ring of cupola.

BOTTOM POUR LADLE—Ladle where metal, usually steel, flows through a nozzle in the bottom.

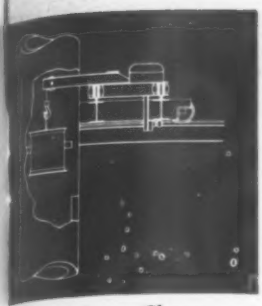
BOTTOM POUR MOLD—Mold gated at the bottom.

BOWLS—See ladle.

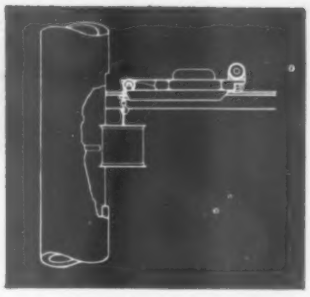
BRACKET—Strengthening strip or rib on a casting.

BRAD—Nail with a small head.

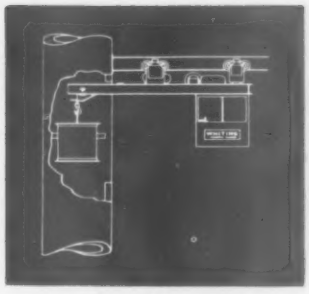
(To Be Continued)



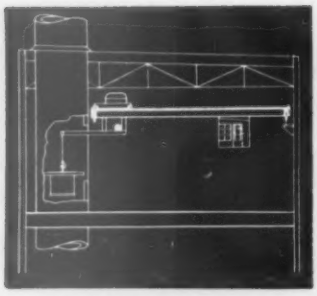
Gantry Crane Charger



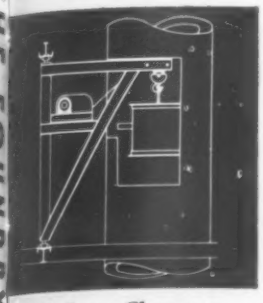
Horseshoe Charger



Monorail Charger



Underslung Charger



Jib Crane Charger

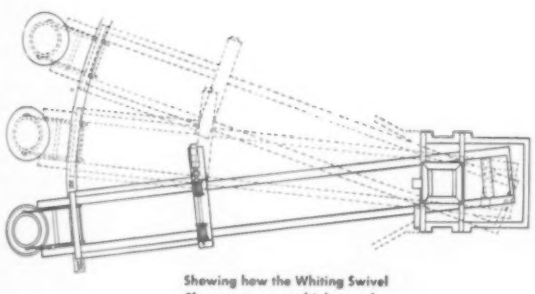
Vertical Skip Hoist

WHITING *first* with Mechanical Charging

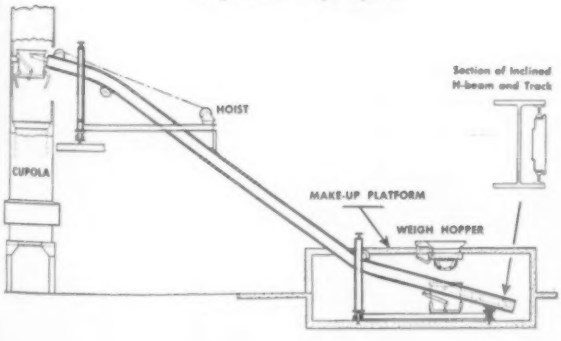
Only Whiting can offer you the experience gained in *more than 40 years* of designing and building successful mechanical charging installations. Whiting has built *over 400 chargers*—from simple skip hoists for small cupolas to completely mechanized systems for large foundries.

Whiting provides individually engineered charging installations to meet the particular needs of any combination of operating conditions. Surrounding this page are diagrams of some of the many different types of installations which Whiting has designed and built. Depending on circumstances, cone bottom, single or double leaf drop bottom buckets are employed.

Practical engineering by experienced foundrymen enables Whiting to design charging equipment which will provide metallurgical control as well as cost control in cupola operation.



Showing how the Whiting Swivel Charger serves multiple cupolas

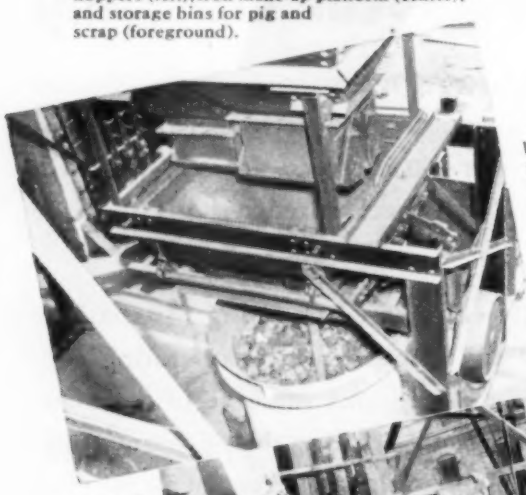


Inclined Swivel Charger for serving multiple cupolas. Charger frame may be hand-operated, or arranged with automatic power indexing, push button control.

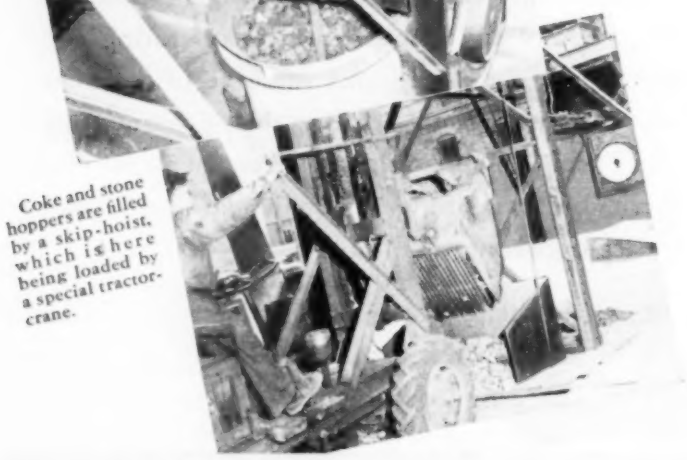
SEE NEXT PAGE FOR VIEWS OF A TYPICAL WHITING COMPLETELY MECHANIZED CHARGING INSTALLATION WHICH HAS REDUCED CHARGING COSTS TO A THIRD OF WHAT THEY WERE WITH HAND CHARGING.

COMPLETELY M

The material yard showing coke and stone hoppers (left), iron make-up platform (center), and storage bins for pig and scrap (foreground).



Close-up of the batch weigh hopper after coke and stone have been dropped into the charging bucket.



Coke and stone hoppers are filled by a skip-hoist, which is here being loaded by a special tractor-crane.

An effective means to lower production costs . . . increase output . . . improve products . . . make safer working conditions and remove a source of labor irritation.

Mechanization of cupola charging operations is a comparatively simple improvement with far-reaching effects in bettering foundry profits. For example, the user of Whiting Charging Equipment illustrated on these pages reports the following advantages:

1. Reduces charging costs 30% to 35% through increased efficiency.
2. Releases 14 out of 18 men for more effective work.
3. Eliminates "waiting" time—equipment handles 3,000 lb charges on a 3 minute cycle.
4. Eliminates the hard work, thus improving employee relations. Hundreds of foundries of all sizes are using Whiting Charging Equipment . . . these are some of the additional advantages they report

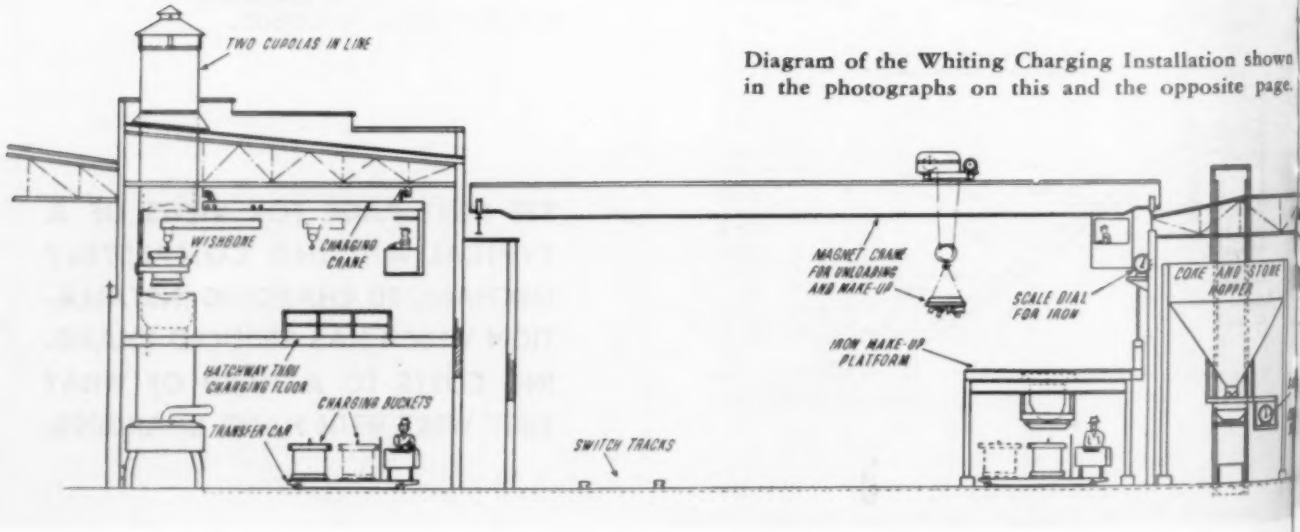


Diagram of the Whiting Charging Installation shown in the photographs on this and the opposite page.

MECHANIZED *from* MATERIALS YARD TO CUPOLA

5. Savings in materials through better weight control and improved melting practice.
6. Better products due to more accurate proportioning of materials and more uniformly hot metal.
7. Savings in space through elimination of the charging floor and elevators.
8. Less supervision required with mechanized operation.
9. Safer and more agreeable working conditions.

An investment in Whiting Mechanical Charging Equipment can usually be retired in from one to two years from actual savings. Let Whiting engineers analyze your individual requirements and recommend suitable equipment for up-to-date profit-building cupola charging.

The magnet crane brings a load of pig from storage bin to make-up platform. Any excess above the amount needed for the charge is deposited on the platform.

Close-up of the iron make-up platform showing square opening to batch weigh hopper, surrounded by piles of scrap and pig of various kinds.

Transfer car with cone-bottom charging bucket ready to receive coke and stone, which are weighed in the hopper by the car operator before being dropped into the bucket.

WHITING CORPORATION

5607 Lathrop Ave. Harvey, Illinois

...ffices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, ...ttsburgh, St. Louis, and Washington, D. C. Agents in other principal cities. ...nadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario.

WHITING

FOUNDRY EQUIPMENT

WASHINGTON *Notes* ★★★

A CONSTRUCTIVE type of publicity is apparent in recent government releases relative to job opportunities in the foundry industry, in contrast to the harmful wartime pronouncements concerning the undesirable features of foundry work. Commenting on the need for increased production of castings to speed national reconversion, and the urgent requirement of foundries for tens of thousands of additional men, a recent WPB release said in part: "Those who wish to take advantage of this opportunity for good, permanent jobs in a basic industry should apply to their local foundries and the local USES offices. In many instances, plant personnel training programs are available and workers who have lost war plant jobs should be able to train themselves quickly for skilled and semi-skilled foundry positions which pay better than average industrial wages."

★ ★ ★

Some 176 key industry advisory committees are being retained by the Civilian Production Administration, the successor to WPB. This is less than one-fourth the total of 780 committees which served the Office of Production Management and WPB during the war years. Among the committees CPA plans to consult on reconversions are those representing gray iron, steel, malleable, brass and bronze foundries, and producers of cast iron soil pipe and fittings.

TO PERMIT equitable distribution during reconversion, pig iron has been placed under the preference rating system. This permits anyone who qualifies under the priorities assistance regulation, PR-28, to apply to CPA for a rating to obtain pig iron. Orders bearing such preference ratings must be accepted and filled regardless of existing contracts and orders, except in certain cases specified in Priorities Regulation 1. These ratings, of course, are granted only in those exceptional cases where a buyer has been unable to obtain sufficient iron through ordinary channels. In most instances pig iron is readily available without a preference rating.

★ ★ ★

The increase of 75 cents a gross ton in maximum ceiling prices on pig iron, effective Oct. 23, is the second boost since price control began on June 24, 1941. When OPA raised the ceiling $1 a ton last Feb. 14 the agency promised a re-examination of changes in operational costs, and the 75-cent increase is based on results of that study, which reportedly showed a sharp rise in production costs during the first two quarters of 1945.

★ ★ ★

THE Patent Office hopes to simplify and expedite the process of issuing patents, particularly so as to make it easier and less expensive for the small inventor with a patentable idea to receive service. In the third quarter this year patent applications were 35 per cent more numerous than a year ago, but the number granted showed a decrease because of the shortage of help.

★ ★ ★

Much of the talk heard regarding companies which have held patents merely in order to suppress an improvement is exaggerated, Washington officials say. In most cases patent holders shelve their developments because the improvements are not needed. This is reflected in the fact that a number of holders of large numbers of patents are offering them, through the Patent Office, to other manufacturers. One large manufacturer is offering 1000 of such patents.

★ ★ ★

BUSINESS men of the future will have much more and better statistics concerning business activity and markets than did those of the prewar period. Many figures were issued during the war that had never been available previously, and the Bureau of the Census is planning compilation of additional statistics that will be valuable to industry in planning and evaluating its sales.

★ ★ ★

What it took to win a two-front war: The $186 billion we spent on munitions between July 1, 1940 and Aug. 1, 1945, bought 86,338 tanks, 297,000 airplanes, 17,400,000 rifles, carbines and sidearms, 315,000 pieces of field artillery and mortars, 4,200,000 tons of artillery shells, 41,400,000,000 rounds of small arms ammunition, 64,500 landing vessels, 6500 other Navy ships, 5400 cargo ships and transports, and similarly enormous amounts of other material.

W.G.C.

OBITUARY

JOHN HILL, 82, president of the Hill & Griffith Co., Cincinnati, for nearly 50 years, died Nov. 6. Born in Dalton, Ga., he worked as a boy of 12 helping in the plant of the Dalton Foundry & Machine Co., owned and operated by his father, Robert Hill. At 17 he went to work for the Ainsley & Cochrane Foundry Co., Louisville, Ky. After a brief period in the railroad field he returned to the foundry as a salesman for the S. Obermayer Co., for whom he sold foundry equipment and supplies all over the United States. Thirteen years later, in 1897, he organized his own company. He was a charter member of the American Foundrymen's Association and a regular and prominent attendant at every convention. He was one of the group of American foundrymen who attended the first International Foundry Congress in Paris in 1923. At the Buffalo convention of the association April, 1944, he was awarded an honorary life membership for long and continuous effort in behalf of the industry and the association.

JOHN HILL

• • •

David McLain, 82 one of the most widely known men in the foundry industry, died in Milwaukee, Oct. 19. He was born in Belfast, Ireland, in 1863 and with his parents and other members of the family settled in Pittsburgh five years later. At the age of 10 he had a job twisting hay rope in a pipe foundry, and when he was 15 he was a duly qualified molder. At 23 he was a foreman in the first bessemer converter steel foundry in America. From 1897 to 1900 Mr. McLain operated a crucible steel foundry in Milwaukee. Later while superintendent in a plant operating iron, steel and brass foundries he completed experiments on using large amounts of steel scrap in cupola mixtures. In 1906 he organized McLain's System to provide a correspondence course in mixing irons, cupola practice and the production of

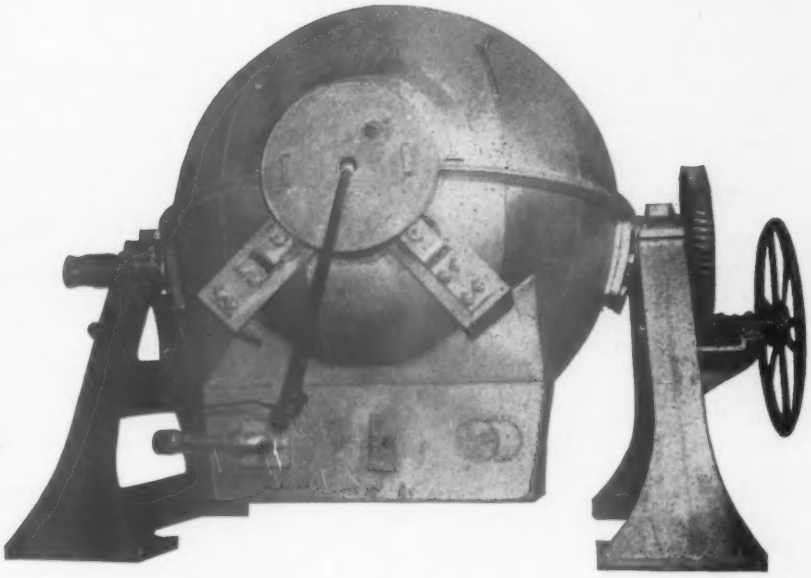
(*Concluded on page 152*)

DAVID McLAIN

NOW--MELT 3000 LBS. AT ONCE WITH A

ROMPH ROTATING FURNACE

A Revolutionary NEW-TYPE MELTING FURNACE FOR *Aluminum*



Note these IMPORTANT improvements in Aluminum Melting Practice

This new development is the design of Mr. Paul Romph, a practical foundryman, and is now offered as a direct aid in meeting post-war competition.

EXTREMELY FINE-GRAINED METAL

Since the metal charge *at no time* comes in contact with a direct flame, a melt of extremely fine grain and superior quality is produced. Hydrogen absorption is practically eliminated. There are no "local" hot spots and iron pick-up is consequently less. Fluxing by gas or solid material is possible.

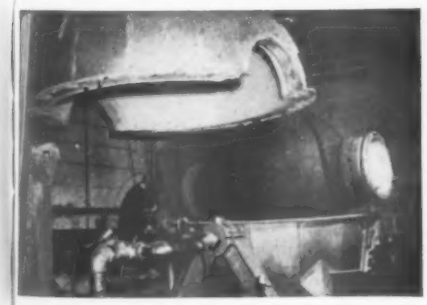
LOWER FUEL COSTS—FASTER MELTING

Note this typical aluminum heat: heel—300 lbs; ingot charge—2750 lbs; burner time—*136 minutes* (to 1400° F). Fuel consumption (gas)—2,924 cu. ft, or slightly over one *cu. ft. of gas per pound of metal.*

EASIER TO OPERATE AND MAINTAIN

In case of pot failure, the charge is not lost. Merely rotate pot to another position and continue melting. In one large production foundry, a run of 3 weeks additional was possible after the pot had been repaired.

FURTHER SPECIFICATIONS AVAILABLE IN FOLDER "F-1"



Melting pot may be changed in few minutes. No long cooling period required before changing.

Easy to charge. Even under maximum operation, the outer shell does not become hot.

Charges may vary from 1000 to 3000 lbs. Large castings can be poured from one furnace melt.

ROMPH FURNACE COMPANY
7849 HARTWELL DEARBORN, MICH.

(*Concluded from page* 150)

semisteel, the forerunner of modern high test cast iron.

Mr. McLain was instrumental in training thousands of men in the proper methods of mixing and melting iron. In 1910 he completed his system of steel foundry practice covering electric, open hearth and converter methods. He was an honorary member of the Institute of British Foundrymen. At the Detroit convention of the American Foundrymen's Association in 1936 he was awarded the J. H. Whiting Gold Medal in recognition of his many contributions to the progress of the foundry industry in the training of men and the stimulating of wide interest in better melting practice.

* * *

Milo C. Sammons, 63, president of the Wadsworth Core Machinery & Equipment Co., Akron, O., died suddenly Oct. 17 at his home in nearby Silver Lakes estates. With the exception of ten years with the engineering department of the United States Telephone Co. in Cleveland, 1900 to 1910, he had been a continuous resident of Cuyahoga Falls, O., where he was associated with his father-in-law, the late George Wadsworth, founder and for many years head of the company which bears his name.

* * *

Henry Lange, 71, secretary-treasurer and manager, Quincy Stove Mfg. Co., Quincy, Ill., died there Oct 13. A native of Muehlhausen, Germany, he came to this country about 1890 and became associated with the C. H. Wurst Hardware Co., Quincy. Later he and Henry Wurst organized the Orinda Stove Co., which merged with the Quincy Stove Mfg. Co. in 1915. Mr. Lange was named manager, a position he held until his death.

* * *

Michael J. Powers, 91, Chicago sales representative, J. S. McCormick Co., Pittsburgh, died Oct. 15 in Chicago. He had been associated with the company 45 years and connected with the foundry industry over 65 years. He was one of 54 "Old Timers" honored by the Chicago Chapter of the American Foundrymen's Association, last December.

* * *

S. C. Johnson, 68, who had served as superintendent with Milwaukee Steel Foundry Co., Pelton Steel Castings Co., Maynard Electric Steel Casting Co., and Wehr Steel Co., all of Milwaukee, died recently while on a hunting trip.

* * *

Edward G. Gustafson, 60, treasurer, Independent Pneumatic Tool Co., Chicago, died Oct. 12 in that city. He had been associated with the company since 1903, having served as treasurer for 30 years and as a director since March, 1944.

* * *

Thomas A. Hosty, 53, president and owner of the Standard Pattern Works Co., Cincinnati, which he founded in 1913, died Oct. 3 in that city.

* * *

John X. Farrar, 56, assistant secretary and advertising manager, the Jeffrey Mfg. Co., Columbus, O., died there Oct. 11. Mr. Farrar had been with the company for 32 years.

* * *

Walter Schoenbach, 72, recently associated with Silverstein & Pinsof Inc., Chicago, died in that city Oct. 21.

* * *

William E. Kane, 79, president of Kane & Roach Inc., Syracuse, N. Y., which he founded in 1887, died Oct. 11 in that city. Mr. Kane was well known as a designer and inventor of numerous and varied types of machinery.

Metal Society Holds Annual Meeting

At the annual meeting of the American Society for Metals, held Nov. 2 in Cleveland, Dr. C. H. Herty Jr., assistant to the vice president, Bethlehem Steel Co., Bethlehem, Pa., was elected national president, succeeding Dr. Kent

DR. C. H. HERTY JR.

R. Van Horn, assistant manager, Cleveland Research Division, Aluminum Co. of America, Cleveland. Other officers elected include: Vice president, A. L. Boegehold, head of the metallurgy department, Research Laboratories Division, General Motors Corp., Detroit, treasurer, Dr. H. K. Work, manager of research and development, Jones & Laughlin Steel Corp., Pittsburgh; trustees, John Chipman, professor of metallurgy, Massachusetts Institute of Technology, and W. E. Jominy, chief metallurgist, Dodge Chicago Plant, Chrysler Corp., Chicago.

Dr. Herty, a graduate of University of North Carolina in 1918, was engaged in the Chemical Warfare Service of the United States for two years and in 1924 received his doctor of science degree from Massachusetts Institute of Technology. After serving as physical chemist with the U. S. Bureau of Mines, Pittsburgh, for five years, Dr. Herty became director of research, Metallurgical Advisory Board, Pittsburgh, in 1931. He joined the Bethlehem Steel Co. as research engineer in 1934 and was appointed assistant to the vice president in 1942.

Readers' Comment

Surplus Foundry Equipment

To the Editors:

In a very interesting piece in the October issue of The Foundry, Mr. Tuscany, secretary-treasurer of the Foundry Equipment Manufacturers Association, mentions the possibility of surplus foundry equipment going to the colleges under the various laws and regulations whereby this is authorized. After some little experience with the surplus equipment problem, I am inclined to believe that the foundries, and possibly the association, can be exceedingly helpful to the colleges if the industries will indicate to the colleges in advance, what items of equipment in their plants will shortly be declared surplus.

We have found that it is infinitely easier to obtain surplus equipment for our college if we turn in our various requests and reports while the equipment is still in the plant and before it has been taken up by Ordnance, Reconstruction Finance Corp., or other governmental agencies. In this case, the Ordnance officer or other government official who is resident in the plant, authorizes the equipment to be removed as surplus, the college sends a truck to get it and the papers go through all the red tape very fast because there is no question of storage or handling by any government agency. If any foundry will give the nearest engineering college an advance tip on property about to be declared surplus, the colleges will be immensely grateful.

The article was very enlightening and I enjoyed reading it.

C. J. Freund
Dean, College of Engineering
University of Detroit

Editorial Is Inspiring

To The Editors:

May I congratulate the editor for the inspiring editorial in the November issue.

I think the men in the foundry industry should offer their best, not only by comment but by hard working effort to eliminate the unhealthy thoughts relative to the foundry industry which have been formed in the minds of the public as a result of unfavorable publicity.

The editor's four points of development are essential. The quicker foundry executives realize that they must adopt and follow through on these suggestions, the sooner will the foundry industry enjoy the top position in the industrial world to which it is entitled.

E. R. Steinmann,
President
E. R. Steinmann & Associates
1 De Kalb Avenue
Brooklyn 1, N. Y.

Reference Check List of

Products for the Iron and Steel Industries

All wartime restrictions covering the application, sale and delivery of the following products have been removed. They are now available for immediate shipment to meet your requirements for peacetime and civilian production needs.

PRODUCT	NOMINAL COMPOSITION	APPLICATIONS
ALSIFER	Aluminum.....20% Silicon.....40% Iron.....40%	Used principally as a steel deoxidizer and for grain size control.
FERRO CHROMIUM High Carbon Grade	Chromium..66-70% Carbon.....4-6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium..62-66% Carbon.....4-6% Silicon.....6-9%	For alloyed cast irons. Readily soluble as a ladle addition at the lower temperatures of cast iron.
Low Carbon Grades	Chromium..67-72% Carbon.....06% .10%, .15%, .20%, .50%, 1.00% and 2.00% maximum	For low carbon chromium steels, especially those with high chromium content, such as stainless and heat-resistant types.
FERRO SILICON 25-30% Grade	Silicon.....25-30%	Deoxidizer for open hearth steels; also for high silicon, corrosion-resistant iron castings.
50% Grade	Silicon.....47-52%	Used extensively in steel making both as a deoxidizer and for the addition of silicon to high silicon steels, for springs, electrical sheets, etc. Pulverized form used as ladle addition to cast irons for silicon content and graphitization control.
75% Grade	Silicon.....74-79%	For high content silicon steels, such as spring steels, sheets and forgings of high magnetic qualities for electrical apparatus.
High Silicon Grades 80-85% 85-90% 90-95%	 Silicon....80-84.9% Silicon....85-89.9% Silicon.....90-95%	For high content silicon steels where small ladle additions are used for required silicon content. Also for manufacture of hydrogen by reaction with caustic soda.
FERRO TITANIUM High Carbon Grade	Titanium...15-18% Carbon.....6-8%	Final ladle addition to control "rimming" action and cleansing of effervescing steel. Final deoxidizer and scavenger for steel castings and fully killed ingot steels.
Medium Carbon Grade	Titanium...18-21% Carbon.....3-4.50	Often preferred to the High Carbon Grade as a final ladle addition to very low carbon rimming or effervescing steels.
Low Carbon Grades 20-25% Ti Grade	Titanium...20-25% Carbon.0.10% Max. Silicon....4% Max. Aluminum 3.50% Max.	As a carbide stabilizer in high chromium corrosion resistant steels of extremely low aluminum content. Deoxidizer for some casting and forging steels.
40% Ti Grade	Titanium...38-43% Carbon.0.10% Max. Silicon....4% Max. Aluminum 8% Max.	As a carbide stabilizer in high chromium corrosion resistant steels, where smaller ladle additions are desired and extremely low aluminum content is not essential.

PRODUCT	NOMINAL COMPOSITION	APPLICATIONS
FERRO VANADIUM Grade 'A" (Open Hearth)	Vanadium...35-40% Silicon...12% Max. Carbon.3.50% Max.	For low percentage vanadium content of rolled, forged or cast constructional steels. Also used in vanadium cast irons.
Grade "B" (Crucible)	Vanadium...35-45% Silicon 3.50% Max. Carbon.0.50% Max.	For tool steels and special steels containing high percentages of vanadium, in which required limits for carbon and silicon are narrow.
Grade "C" (Primos)	Vanadium...35-45% Silicon.1.25% Max. Carbon.0.20% Max.	For tool steels and special steels requiring high percentages of vanadium and exceptionally low carbon and silicon content.
Special Grades	Vanadium...50-55% 60-65% 70-80% Silicon....Low Carbon....Low	For special applications and uses requiring large vanadium additions.
VANADIUM METAL 90% Grade	Vanadium...91.15% Aluminum.. 3.87% Silicon..... 0.50% Carbon..... 0.17%	For special iron-free (non-ferrous) or low iron alloys or low impurity ferrous alloys.
95% Grade	Vanadium...95.18% Aluminum... 2.00% Silicon..... 0.27% Carbon..... 0.15%	Principally for research on the properties of pure alloys.
VANADIUM PENTOXIDE V_2O_5 ....90% Technical Grade Fused Form		A source of vanadium in basic electric furnace steels. A base for numerous chemical compounds.
GRAINAL ALLOYS Vanadium Grainal No. 1	Vanadium...25.00% Aluminum...10.00% Titanium....15.00% Boron..... 0.20%	Practical and economical intensifiers for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties. For the varying requirements of the trade, three grades are available.
Vanadium Grainal No. 6	Vanadium...13.00% Aluminum...12.00% Titanium....20.00% Boron..... 0.20%	
Grainal No. 79	Aluminum...13.00% Titanium....20.00% Zirconium... 4.00% Manganese. 8.00% Boron..... 0.50% Silicon..... 5.00%	
V-FOUNDRY ALLOYS V-5 Grade	Chromium..38-42% Silicon.....14-16% Manganese. 8-11%	Used in cast irons as a ladle addition. Reduces chill, promotes uniformity of structure, increases strength and hardness. Two grades are available, choice of which depends on consumer's practice and products.
V-7 Grade	Chromium..28-32% Silicon.....15-21% Manganese.14-16%	
GRAPHIDOX No. 4	Silicon.....45-50% Titanium... 9-11% Calcium.... 5-8%	New alloy for the graphitization of iron; ladle treatment insures iron with normal graphite, free from dendritic structure; reduces chill; efficient inoculant in the production of high strength irons.

Our metallurgical engineers are available to work with you in the application of any of these products to your requirements for iron alloys and steels.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. · DETROIT · CHICAGO · CLEVELAND · PITTSBURGH

Activities of foundry GROUPS

Central Illinois

ON Oct. 18, 14 foundry executives of the central Illinois district met at a dinner in the Pere Marquette Hotel in Peoria for the purpose of forming a local committee to consider the organization of an AFA chapter. At this meeting the committee was organized and started on the road toward developing a petition to be forwarded to the AFA board of directors for the approval of a chapter in that district.

The committee organization is as follows: Chairman, Ed Roby, superintendent, Peoria Malleable Castings Co., Peoria; vice chairman, Z. Madacey, foundry superintendent, Caterpillar Tractor Co., Peoria; secretary, C. W. Wade, foundry training supervisor, Caterpillar Tractor Co.; treasurer, Al Martens, president, Pekin Foundry & Mfg. Co. Pekin, Ill. The group appointed Frank Shipley, foundry manager, Caterpillar Tractor Co. as chairman of the program committee, and Haydn Laycock, Frederic B. Stevens Inc., as chairman of the membership committee.

After this meeting the officers met and laid plans for the first opening meeting of the group, held at the Jefferson Hotel, Nov. 19. At that meeting all those interested were given an opportunity to sign the petition for the chapter.

In addition to the officers named, the organization committee is composed of the following: C. N. Bucklar, Superior Foundry Co., East Peoria; Haydn Laycock, Frederic B. Stevens Inc.; H. J. Scheffler, Keckley Mfg. Co., Springfield; Frank Hayes, Capitol City Pattern Works, Springfield; Prof. Carl E. Schubert, University of Illinois, Urbana; Ed Burns, Illini Foundry, Bartonville; Frank Willis, Brass Foundry Co., Peoria; V. W. A'Hearn, Midwest Pattern Works, Peoria; J. Kolb, Caterpillar Tractor Co.; F. W. Shipley, Caterpillar Tractor Co.

Western Michigan

OPENING technical meeting of the season for the Western Michigan Chapter of the AFA was held Oct. 8 at the Hotel Schuler, Grand Haven, Mich., with 91 members and guests present.

Chapter Chairman J. Wesley Lee presided at the dinner meeting, and after introducing the various committee chairmen, briefly outlined the tentative program for the 1945-46 season.

Program Chairman Fred McCarthy then presented George Watson, Electro Metallurgical Sales Corp., Chicago, who gave a highly informative talk on the history and usage of ferroalloys. He outlined specifically benefits derived by the use of alloys in the gray iron, steel and nonferrous castings industries. A large percentage of these alloys are imported, but receipts were maintained during wartime despite shipping hazards.

A lively discussion followed the talk, with William McFerrin, Ralph Clark and Bob Aeberly answering questions.—*R. W. Hathaway.*

Canton

AT the group's first meeting of the season Canton District Chapter of the AFA was host to the Ohio Society of Professional Engineers Oct. 18, when 122 members and guests met at the Mergus Restaurant, Canton. Conrad Traut gave the first of five coffee talks on "Job Relations" to be presented during the season in a series of educational instruction on management-employee relations. Mr. Traut is manager of the vocational training department of the Hoover Co., North Canton.

J. A. Rassenfos, supervising engineer, research laboratories of the American Steel Foundries, Chicago, was the main speaker of the evening and chose a subject of equal interest to the engineer and to the foundryman, "Some Notes on the Manufacture, Design and Engineering Application of Castings." Problems in producing sound castings were illustrated by lantern slides, and methods of dealing with them were described. The speaker pointed out how the force of gravity, atmospheric pressure and temperature gradient can be put to use in overcoming difficult casting jobs.

Mr. Rassenfos suggested the use of radiography in placing of gates and risers. Inclusions and their effects on physical properties were also discussed. The talk was concluded with a showing of slides which illustrated the use of steel castings.— *Nils E. Moore, reporter.*

Chesapeake

SEPT. 28 marked the season's first meeting of the Chesapeake Chapter, AFA, at Baltimore. National President Fred Walls, Secretary William Maloney, and Awards Chairman Lee Wilson were present to get the chapter off to a fine start. Mr. Wilson presented Rear Adm. A. H. Van Keuren, director, Naval Research Laboratory, Washington, with the honorary life membership in the AFA which was awarded to him this year. The admiral had been unable to be at Chicago for presentation of the 1945 awards, and the Officers' Night of the Chesapeake Chapter afforded a perfect setting for the ceremonies.

Admiral Van Keuren spoke briefly on the need for basic research in the foundry industry and advocated continued and intensified co-operation among foundrymen and between government and industry to the end that science might one day place the foundry in its rightful place

(*Continued on page* 157)

MICHIANA CHAPTER: Scene at recent monthly meeting of the AFA chapter at St. Joseph, Mich. (Photo courtesy of V. S. Spears, American Foundry Equipment Co., Mishawaka, Ind.)

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(*Continued from page* 154)

as a leading basic industry.

Werner Finster, metallurgist, Reading Steel Castings Division of the American Chain & Cable Co., Reading, Pa., gave an exceptionally fine technical talk on "Steel Foundry Sands." He blended the technical points of his talk skillfully into shop practice and showed how scientific test methods could be used to practical advantage in the steel foundry to predict sand behavior. Complete analyses of typical sand mixes used by steel foundries were shown which clearly indicated the degree of control possible over sand practices in carefully regulated shops. Of particular interest was his discussion of so-called Washburn or knock-off cores used at the junction of riser and casting to facilitate riser removal by a blow from a sledge hammer. This re-adoption of an old principle is spreading rapidly. Mr. Finster's talk closed with a lively discussion on "flowability" of sand, its meaning and its measurement.

The chapter was favored by the attendance of Max Kuniansky and Stanley Brinson from down Lynchburg and Norfolk way.—*Howard F. Taylor, chairman.*

Philadelphia

FIRST MEETING of the season for the Philadelphia Chapter, AFA, was held Oct. 12 at the Engineers' Club, with about 175 members and guests in attendance. J. M. Robb Jr., new chairman of the chapter, presided. Reminding the members that the success of the chapter rested in the hands of those engaged in committee work, Mr. Robb asked for maximum committee activity and for willingness on the part of members to serve. Retiring Chairman Robert Latham and the ever-loyal and hard-working retiring secretary-treasurer, William Coleman, were presented gifts of appreciation for their work in the chapter.

Mr. Robb called attention to the elementary foundry course to be given at the University of Pennsylvania. The course covers a discussion of various metals, in 18 lectures, beginning Nov. 5 and ending March 18, 1946.

Speaker of the evening was Harry W. Dietert, president, Harry W. Dietert Co., Detroit. In his usual capable manner Mr. Dietert instructed the members on high temperature sand testing, emphasizing mold atmosphere control. By the use of color film he pointed out the results of oxidizing and reducing atmospheres on metal and sand interfaces at elevated temperatures, and indicated the necessity for atmospheric control, the solution of which, to date, has not been entirely and satisfactorily demonstrated.—*E. C. Troy, publicity committee.*

New Jersey

A SANE and fair administration of the New Jersey state law against discrimination was promised by the Hon. Joseph L. Bustard, assistant commissioner of education, state of New Jersey, and head of the division against discrimination, in an address before the New Jersey Foundrymen's Association at the Newark Athletic Club, Newark, N. J., Oct. 29.

No "railroading" or "Gestapo" methods will be countenanced, he said, and every effort will be made to thoroughly screen all complaints of violation and to handle cases with proper discretion. Many cases, he was sure, would be settled without resort to public hearing and other formal procedure. He placed much stress in meeting the discrimination problem on the development of good will and understanding through educational processes.

M. J. Hogan, manager, Bierman-Everett Foundry Co. Inc., Irvington, N. J., was re-elected president of the association. Max Traum, president, Sacks-Barlow Foundries Inc., Newark, N. J., was named vice president, and J. A. Williamson, Barnett Foundry & Machine Co., Irvington, N. J., treasurer.

H. L. Edinger, president of the Barnett Foundry & Machine Co., and new president of the Gray Iron Founders' Society, reported briefly on the highlights of the annual meeting in Chicago recently.

Commenting on the anti-discrimination law of New Jersey, Mr. Bustard pointed out that it corresponds in many respects to the recent New York state enactment, the principal difference lying in the administrative setup. In New York, he said, a special commission was established, whereas in New Jersey the administration was brought under the department of education, with himself, as assistant commissioner, appointed to head the work. He added that a group of several public-spirited citizens from various parts of the state, working without compensation, has been organized as an advisory council, and that "good will" agencies are being set up in various communities.—*Ben K. Price.*

New England

REGULAR monthly meeting of the New England Foundrymen's Association, held Oct. 10 at the Engineers' Club, Boston, was attended by 160 members and guests. Members of the Nonferrous Foundrymen's Association of New England were special guests of the evening. Justin A. Duncan, president of that association, addressed the meeting briefly, immediately following the dinner.

Speaker of the evening Harry W. Dietert, of the Harry W. Dietert Co., Detroit, spoke on "Improvement of Casting Surfaces Through Molding Sand and Core Mixture Control." Mr. Dietert showed

BALTIMORE: National Officers' Night and season's opening meeting of Chesapeake Chapter, AFA, on Sept. 28 was occasion for presentation (top row, center) of honorary life membership in the national association to Rear Adm. A. H Van Keuren, director, Naval Research Laboratory, Washington

the effect of mold atmosphere on the surface of castings, stating that until recently the amount of gas pressure in a mold was considered of little importance, but that considerable work had been done recently on this subject because recent methods of testing gas pressure had been perfected. With the aid of color film, Mr. Dietert showed the activity of gas in the mold and its effect on the casting finish. He stated that recent attention to casting finish is attributable in part to the tendency of many companies to substitute stamped parts for castings, because of lower cost of the former.

Stating that in his opinion the foundry industry spends less time and money on research than any other industry, he suggested that foundries in the future, should be willing to set aside a molder and molding machine for research and development, and in this way, would receive large dividends in return. Many questions could be settled to the satisfaction of foundrymen by this means. Foremen who anticipate becoming foundry superintendents, and who are desirous of obtaining as much knowledge of foundry practices and developments as possible, should look with great favor on the research floor as a means to this end.

The speaker's exceptionally fine motion pictures showed effects of introducing gases into the mold, as well as the various facings and self-produced gases on the casting finish. Calling attention to the necessity for an accurate ramming machine in testing for strength of a molding sand, he added that accurate moisture control in the sand is a necessity. —*Merton A. Hosmer, president.*

Mexico City

ON Oct. 6 at Chapultepec Restaurant, Mexico City, Mexico, a group of 56 foundrymen from Mexico City and surrounding territory met to discuss the formation of a chapter of the AFA. R. L. McIlvaine, vice president and Sales Manager, National Engineering Co., Chicago, acted as "minister extraordinary" for the Association at the meeting. The Mexican foundrymen were enthusiastic and are welcoming the suggestion to organize a chapter.

The group that organized the meeting consisted of the following AFA members; Ernesto Villalobos, general manager, Cia Constructora de Marquinaria S. A.; Manuel Goiccechea, general manager, Herio Malleable de Mexico, Fundiciones de Hierro Y Acero S. A.; A. Zapata, manager, Fierrio Esmaltado; Enrique Molina, production manager, La Fundicion La Mexicana; and Nicholas Covacevich, Foundry Supplies and Equipment. R. L. McIlvaine also aided in laying the groundwork that helped bring these foundrymen together to sign the petition seeking a chapter.

Mr. Villalobos acted as temporary chairman. The men present heard Mr. Covacevich explain the many advantages offered by membership in the association and answered questions that were put to him concerning association's activities in the United States

Following the chapter formation discussion and the signing of the chapter petition, the meeting was turned over to Mr. McIlvaine who discussed foundry practice in the United States. Since the meeting, the petition has been forwarded to the AFA and has been approved by board of directors.

Toledo

WILLIAM MALONEY, national secretary, AFA was principal speaker at the first meeting of the season for the Toledo Chapter. A record-breaking crowd of 90 area foundrymen turned out for a dandy turkey dinner, a showing of patterns entered in the national apprentice training contest, an exhibition of sleight-of-hand, and one of the best talks the members have been privileged to hear.

Mr. Maloney devoted his remarks to the aims and purposes of the association. He laid special emphasis on the technical development program, and urged all members to take advantage of the increased research facilities now available, and in turn to contribute in whatever way possible to this program.

The great importance of co-operation by the chapter with engineering colleges, trade and vocational high schools, and even grade schools was stressed by Mr. Maloney. It is from these sources that the replacements so vitally needed by the foundry industry must be secured. Scholarships, teaching courses by qualified members of the chapter,

(*Continued on page* 160)

CLEVELAND PATTERNMAKERS: Shown standing above are some of the patternmaking apprentices who received certificates of completion at a recent meeting of the Pattern Manufacturers Group, Associated Industries, Cleveland. Part of the general gathering at the dinner meeting is seen below

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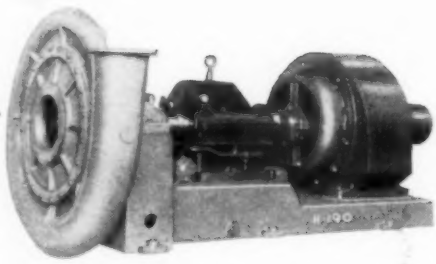

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(*Continued from page* 158)

and offers of foundry equipment, or technical training courses in member foundries, are some suggestions for furthering this program.

New officers and directors installed included: Chairman, Norbert Mahoney, Maumee Malleable Castings Co.; vice chairman, Brock L. Pickett, Unitcast Corp., and secretary treasurer, Gerald Rusk, Freeman Supply Co.

Honorary directors: Charles Carson, National Supply Co., and Victor Zang, Unitcast Corp. Directors: Leslie Brown, Magnesium Fabricators Co., Adrian, Mich.; William Adler, Ohio Steel Foundry Co., Lima, O., Otto Schmidt, National Supply Co., and Ernest Balitz, Ensign Foundry Co.—*R. B. Bunting, Publicity chairman.*

Pittsburgh

STRESSING THE need for a more scientific approach to foundry problems, M. J. Kellner, superintendent of foundries, Walworth Co., Greensburg, Pa., and vice president, Pittsburgh Foundrymen's Association, discussed the excellent results achieved by his company in reducing scrap loss through this procedure, at the group's meeting in Pittsburgh Oct. 22.

Insofar as defective castings are concerned, Mr. Kellner stated that most foundries had two obvious sources of defects: (1) Liberation and absorption of gases from metals; (2) volume changes during solidification.

He pointed out that the one factor that is definitely stressed at the Walworth Co. is the collection of performance data which, when properly evaluated, frequently points the way to the solution of a good many problems that occur in every-day foundry practice. However, collection of data alone is insufficient, since the proper analysis of the data and willingness to apply corrective measures are far more important.

The foundry industry has been rather backward, particularly in certain localities, in attracting engineers or technically trained men into the industry, he said. To induce technical men to enter the foundry industry, we must set the examples from within. However, Mr. Kellner did not advocate that every foundry organization surround itself with a group of engineers or technically trained men to operate the enterprise, although men of this caliber generally will have the more sensible approach to a problem.

Many other problems other than defective castings are encountered and must be overcome to achieve efficient operations. Better methods of production are of prime importance and must be utilized in attracting labor to the industry and in lowering production costs.

The scientific approach to foundry problems is not a panacea to cure all ills, however, for many other factors must also be considered, Mr. Kellner added. No matter how much technical knowledge, equipment, or labor saving devices may

(*Continued on page* 162)

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Lest our friends in other categories feel slighted, we hasten to say that VELSICOL specializes in good Core Oils for *all* metals, both ferrous and non-ferrous; and for those preferring a light color oil, VELSICOL offers its SERIES B OILS. Tell us today what metals you pour, and we'll be glad to submit working samples of the correct oils and complete data. Write or call us or the representative in your territory.

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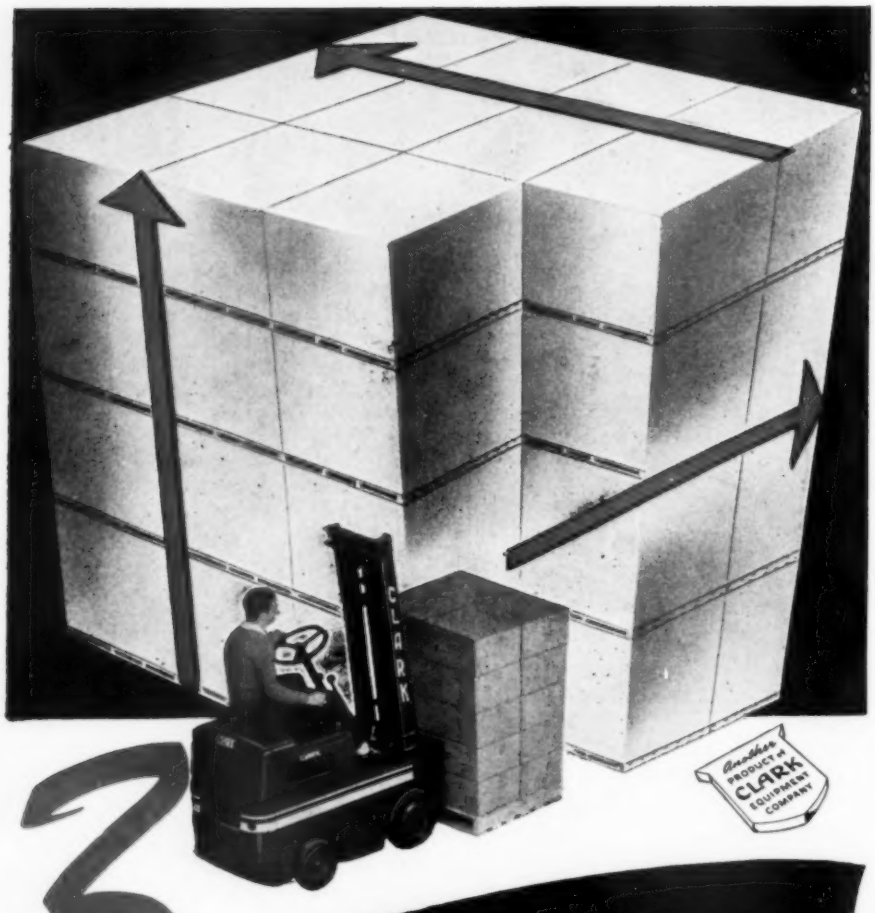

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(*Continued from page* 160)

be utilized, the success or failure of such an approach depends upon the full co-operation or employees.—*Joseph C. Sullivan.*

Chicago

POPULARITY of roundtable-type meetings was demonstrated again when on Nov. 5, Chicago Chapter of the AFA conducted the first of the series of three provided in the 1945-46 program year. Attendance at the dinner meeting at the Chicago Bar Association was well over 200.

In the absence of Chapter President J. C. Gore, Chicago manager, Werner G. Smith Co., Vice Chairman Frank E. Wartgow, supervisory engineer, Hasbrouck Haynes Engineers, presided over general portions of the meeting.

Largest participation in the four roundtables under way simultaneously was at the Gray Iron division session, at which W. A. Hambley, works metallurgist, Allis-Chalmers Mfg. Co., Milwaukee, spoke on "Casting Defects Attributable to Iron Composition." Eugene W. Smith Jr., foundry superintendent, Lindahl Foundry Division, American Gear & Mfg. Co., Chicago, officiated as chairman.

Mr. Hambley, who is chairman of the national AFA Committee on Analysis of Casting Defects of the Gray Iron Division, asserted that the committee has narrowed casting defects down to 29, and of this number sand contributes to 22. The factor of pouring contributes to 25, while iron composition plays a part in 13 defects.

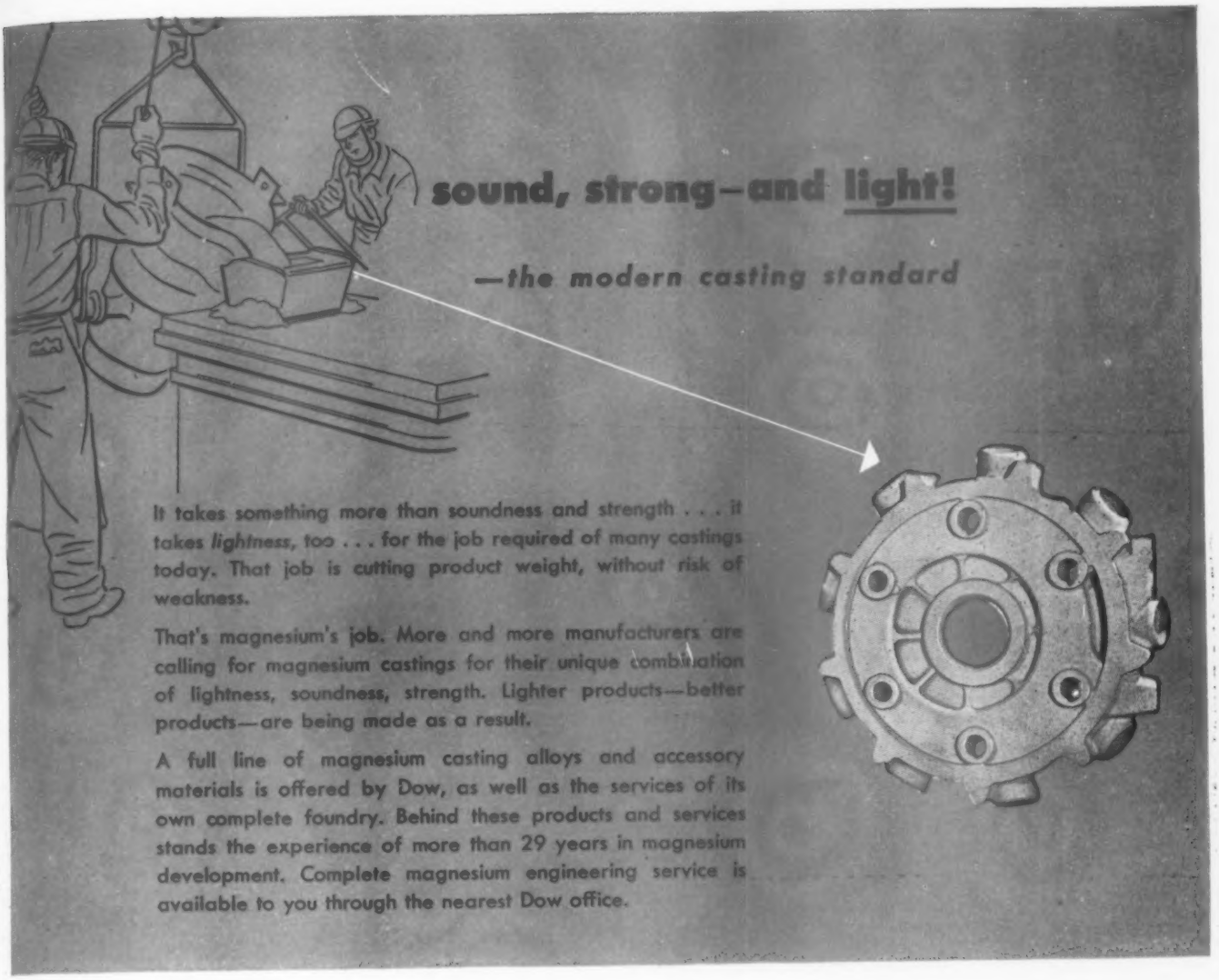
Limiting his discussion largely to defects in the latter category, Mr. Hambley dwelled individually on such conditions as blowholes, inclusions, metal penetration, mass hardness, open grain structure, shrinkage cavities and depressions, warpage, hard areas and chilled spots, mis-runs and cold shuts, and scars, seams and flakes.

As to shrinks and blowholes, the speaker feels strongly that the foundryman does not show sufficient differentiation between them. Casting makers, he contends, must come to the point where they throw out the window their positiveness concerning which is which.

In concluding his remarks, Mr. Hambley said his company has approached the matter of foundry sand from a different angle than other foundries. It holds the belief that there is a proper sand size for each type of casting. In its brass foundry, sand of two screen sizes is being used, and cleaning costs have been cut two-thirds. The problem, he explained, is that of setting the proper sand base size. The foundry must be sold the idea of grain distribution, and he left no doubt that he regards AFA grain fineness number as a detriment to finish of castings.

In co-operation with George W. Anselman, service engineer, Goebig Min-

(*Continued on page* 165)



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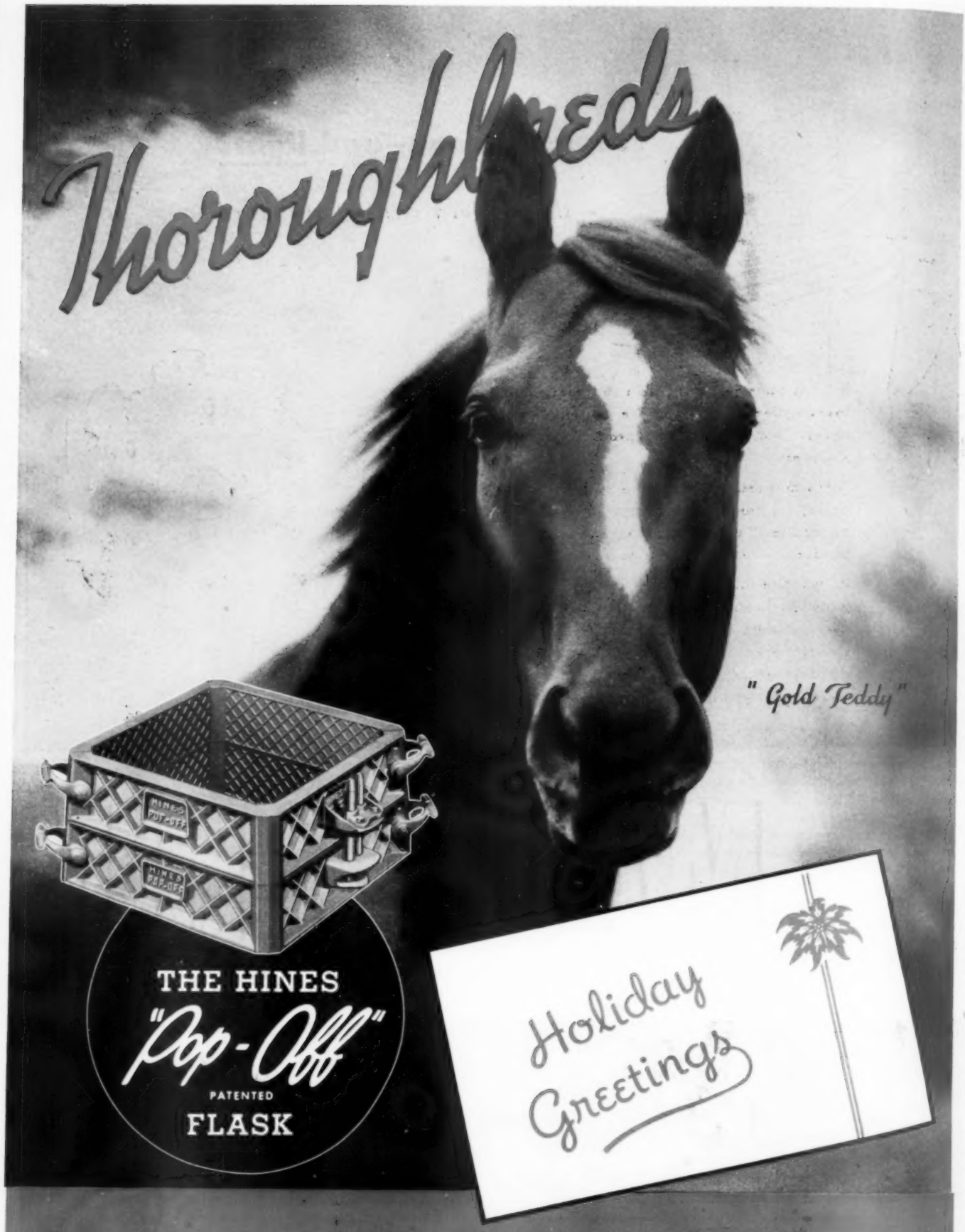

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(*Continued from page* 162)

eral Supply Co., Chicago, and also a member of the AFA casting defects committee, Mr. Hambley showed and explained a large number of slides illustrating defects. Most of the slides were new and had not been viewed previously.

Malleable division devoted its roundtable to "Sand Control," with Gordon Davis, assistant superintendent, malleable foundry, McCormick Works, International Harvester Co., Chicago, as the speaker. W. D. McMillan, works metallurgist of the same plant, was chairman.

Oscar Blohm, metallurgist, Hills-McCanna Co., Chicago, and Adrian C. Den Breejen, chief sand technician, Hydro-Blast Corp., Chicago, collaborated in discussing "Some of the Fundamental Aspects of Foundry Sand" before the Nonferrous division. Harold E. Ferguson, sales engineer, Acme Aluminum Foundry Co., Chicago, presided.

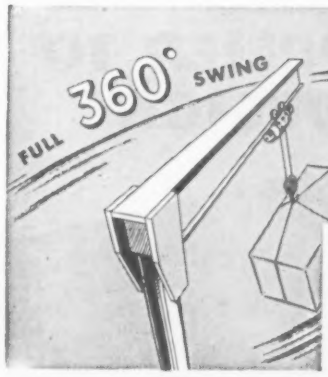
"Use of Ferroalloys" was the topic of the Steel division, with George A. Watson, metallurgist, Electro Metallurgical Co., Chicago, as guest speaker. Clyde Wyman, metallurgist, Burnside Steel Foundry Co., Chicago, was chairman.

For its next general meeting Dec. 3, the chapter has arranged for Bruce L. Simpson, president, National Engineering Co., Chicago, to present his illustrated address on "The History of the Foundry Industry." Conscious of the dearth of historical material available to active and prospective foundrymen, and believing such a narrative would be welcome, Mr. Simpson set out about a year ago to collect material from many sources. Recently completed, the facts constitute a most interesting picture of the beginning and growth of the foundry industry—*Erle F. Ross.*

St. Louis

REGULAR monthly meeting of the St. Louis District Chapter, AFA, was held Oct. 11 at the DeSoto Hotel with 103 members and guests attending. Chairman Walter E. Illig presided. Walter Zeis, chairman of the membership committee, reported 221 paid-up members, as of Sept. 30 and the addition of six new members since the last meeting. He then introduced new members, visitors and guests present. Jack Kelin, chairman of the entertainment committee, disclosed plans for the chapter Christmas party and a discussion of suitable entertainment followed. Otto Shelton, General Steel Castings Corp. was the winner of the attendance prize of $5 in war stamps.

Chester H. J. Walcher of American Steel Foundries introduced the speaker, M. F. Stigers, associate professor, Purdue University, whose varied practical and theoretical experience more than qualified him to talk on the very important subject, "Human Relations in the Foundry." Mr. Stigers quickly convinced all present that he was well versed on the subject



CHICAGO TRAMRAIL
JIB CRANES
SPEED
POINT-OF-OPERATION JOBS

YOU SAVE . . . 1. MANPOWER
2. INSTALLATION COSTS 3. COMPENSATION COSTS 4. PRODUCTION COSTS 5. MAN-HOURS

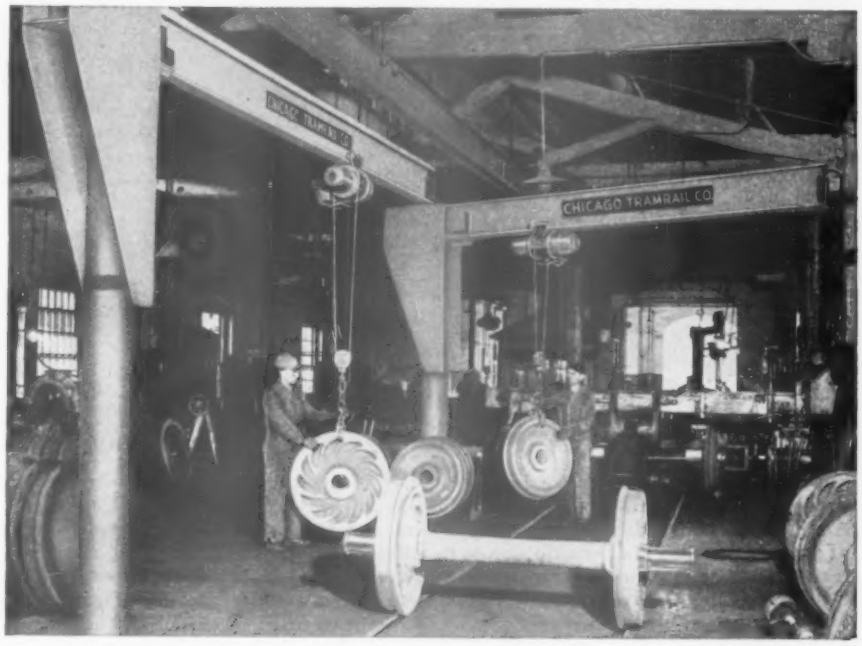
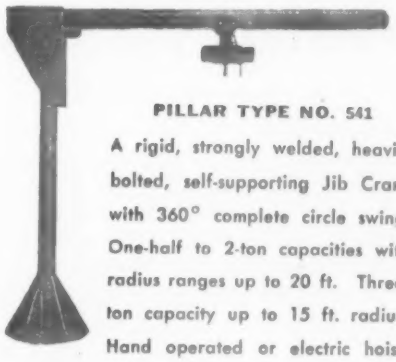


Photo courtesy of Union Pacific Railroad

The assembly of railroad wheel-and-axle units is a job that calls for precise coordination in heavy handling. Too light a job for costly overhead cranes, and too dangerous for all but the most skilled manual labor, it is an ideal application for fast-action, flexible Jib Cranes. Working in conjunction, the two nimble Jib Cranes ease the wheels into place on the axle swiftly and surely, without danger to the delicate bearing surfaces of the axle or journal. This used to be a job for skilled workmen, but now easy-to-operate Jib Cranes take over the difficult task—a real help in these labor-scarce times.

Jib Cranes help to reduce compensation costs because they lessen the probability of accidents that are so frequent in heavy handling. For example, the operation above was formerly a dangerous one. Many strains and broken bones resulted from rolling the heavy wheels into position, but now the men have only to guide the free-swinging Jib Cranes as they swing around, pick up the wheel and carry it to the point of assembly.



PILLAR TYPE NO. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

IN *YOUR* PLANT

It's easy to see how swiftly, economically and safely Jib Cranes perform the operation illustrated. You can effect these same savings in your plant through the use of Jib Cranes. Look around your plant—you're sure to see many places where the use of these sturdy "mechanical muscles" will save you time and money as well as speed up production. Write for full particulars today. We will be glad to send you an illustrated circular showing the various types of Chicago Tramrail Jib Cranes together with many suggested applications for their use.

WRITE TODAY!

CHICAGO TRAMRAIL COMPANY
2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO 12, ILL.

PSYCHOLOGY APPLIED TO WASHROOM DESIGN

Employees have preconceived ideas of washroom standards based on home facilities. These ideas add up to a picture of cleanliness, convenience and sanitation. Anything less than this creates disappointment which is revealed in dissatisfaction and carelessness. This reaction occurs in all cases where inadequate employee facilities exist, but is especially noticeable in such a personal matter as washrooms.

For years, leading industrialists have recognized the human side of production by installing only the most modern wash facilities in all remodeling, expansions and new constructions—Bradley Washfountains.

Bradley's claim to preference is credited to many unusual features: One Bradley does the work of 8 to 10 "single-person" wash basins; piping connections and plumbing fixtures are reduced by 80%—16 to 20 faucets are eliminated. Records also reveal a 70% reduction in water consumption; savings of valuable space and a worthwhile promotion of cleanliness and health.

For interesting information on how to Apply Psychology to Washroom Design, write for Catalog 4308 and Survey Sheet. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wisconsin.

BRADLEY washfountains

Write today for Catalog 4308 and Washroom Survey Sheet.

Bradley circular 5-Stall Shower with receptors: for installation on any kind of floor including wood. Both 3- and 5-Stall Showers can be supplied with or without receptors as desired.

MULTI-STALL SHOWERS

Safe—Sanitary—Economical

Multi-Stall Showers apply the Bradley idea for group washing—and being shipped partially assembled can be installed readily in either new or existing buildings. One 5-Stall Shower unit requires only three plumbing connections compared to the fifteen required for five ordinary showers. *For further details, see Catalog 4308.*

BRADLEY multi-stall showers

of human relations, from an employer's and employee's viewpoint.

Mr. Stiger first spoke of employee interest, stressing the need of employers to invest as much for research in improving human relations as is spent for research on improved methods and equipment. It is necessary to share all of the facts relating to problems arising between employer and employee, and the speaker pointed out that with a better understanding of the problems of both groups, excessive demands will be eliminated and reasonable co-operation secured. The methods of working out these questions are important and will result in the elimination of misunderstandings and will instill trust in the company. Race prejudice and foreman's unions were also discussed as part of the talk. A question and answer period, led by Chester H. J. Walcher, followed, and such intense interest was manifested that this discussion lasted for an hour.—*Lee H. Horneyer, secretary-treasurer.*

Northeastern Ohio

MORE than 200 members and guests were present at the regular monthly meeting of the Northeastern Ohio Chapter, AFA, held at the Cleveland Club, Nov. 8. President A. C. Denison, Fulton Foundry & Machine Co., presided and mentioned that notwithstanding the substantial losses in membership due to the formation of the Canton and Erie Chapters, effective work by the membership committee had brought the roster up to the previous standing.

Mr. Denison introduced Norman F. Hindle, national director, Technical Development Program, AFA, Chicago, who spoke briefly on various activities of the national association. He also stated that he expected that the forthcoming 1946 convention and exhibition to be held in Cleveland probably would exceed all previous ones, and that arrangements on the exhibition and technical program were proceeding excellently. The meeting then broke up into a series of sectional technical sessions.

At the gray iron session presided over by Grover C. Cole, Forest City Foundries Co., and Marcel Reymann, Atlantic Foundry Co., Akron, the discussion included a variety of topics ranging from the performance of a modified hot blast cupola to a type of core that leaves a clean opening in a heavy metal section and which may be blown out with an air hose. Several opinions were expressed on the cause of a hot spot, excessive burning of the lining above the breast in a 42-inch diameter cupola melting approximately 9 tons per hour on an all-day heat. Other features of cupola practice included comparison of mechanical and hand charging, front and back slagging, granulation of slag with a water stream. An interesting question which still remained open after discussion dealt with transmission of certain characteristics from the pig iron to the casting. Reference was made to the

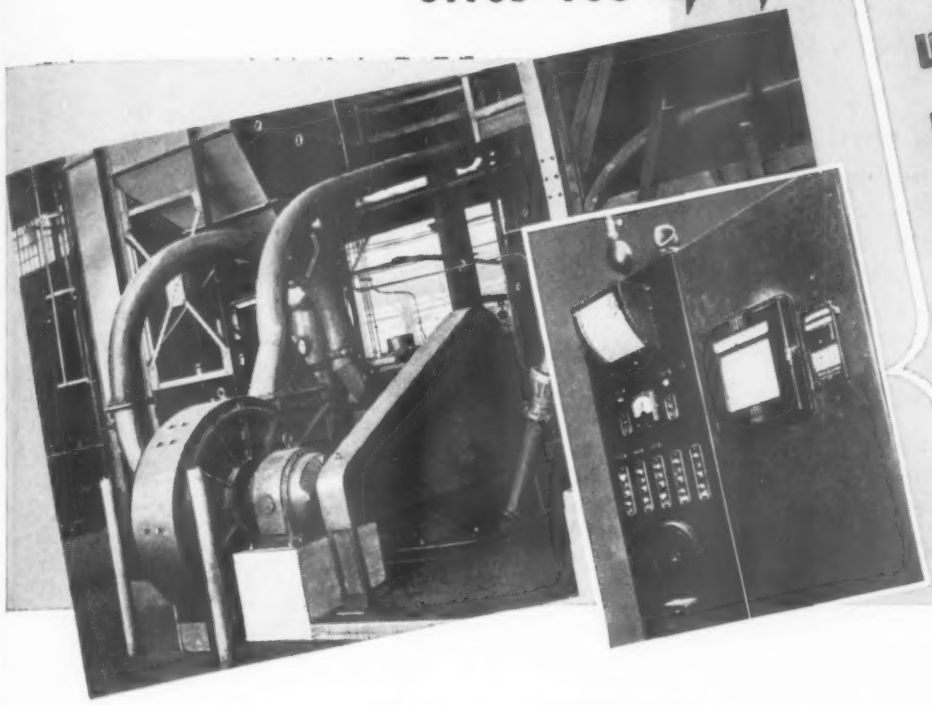
(*Continued on page* 168)

B&W Direct-Firing Pulverized-Coal System for Metallurgical Furnaces Gives You

ONE-POINT FUEL CONTROL

UNIFORM FURNACE TEMPERATURE

ECONOMICAL OPERATION



Close regulation of coal-air ratio and volume —an important feature in the operation of most metal-heating furnaces—is *automatically* obtained with the B&W Direct-Firing Pulverized-Coal Circulating System by controlling the rate of coal feed to the pulverizer so that it is proportional to the primary-air flow.

Once the controller is adjusted for a specific heat, both coal and primary air are always properly proportioned for most efficient combustion and with minimum attention of the operator, the pulverizer supplies coal of proper fineness to the circulating loop at the same rate it is being used by the burners at any particular moment. A substantially constant density of coal and air is assured in the circulating line at all times.

This automatic control provides the same flexibility of multi-furnace operation as with gas or oil—burners may be turned on or off, and adjusted as desired.

Simple, dependable, and convenient, this one-point automatic control is but one of several cost-saving features that make B&W pulverizers so economical for direct-firing of metallurgical furnaces—with and without a circulating system—where high output of high-grade metal products is of prime importance.

Write for *"Pulverized-Coal Firing of Metallurgical Furnaces,"* a 14-page booklet discussing this subject in detail.

B&W

Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

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85 LIBERTY STREET, NEW YORK 6, N.Y.

PM-109

SOME "FALLS BRAND" ALLOYS

Magnesium Aluminum 2%
Magnesium Aluminum 10%
Magnesium Copper 10%
Manganese Aluminum 5%
Manganese Aluminum 10%
Manganese Aluminum 20%
Manganese Aluminum 25%, Metallurgical Grade
Manganese Bronze Hardeners
Manganese Copper 30%, Grade A
Manganese Copper 30%, Grade B
Monel Ingots
Monel Shot
Nickel Aluminum 20/80
Nickel Copper Aluminum 25/25/50
Nickel Copper 15/85
Nickel Copper Ingots 30/70
Nickel Copper Shot 30/70
Nickel Copper Shot 50/50
Nickel Iron 50/50
Nickel Shot
Nickel Silver
Nickel Tin 50/50
Silicon Aluminum 12%
Silicon Aluminum 25%
Silicon Aluminum 50/50
Silicon Bronze Hardeners
Silicon Bronze Ingots
Silicon Copper 10%
Silicon Copper 15%
Silicon Copper 20%
Silicon Copper 30%
Silicon Copper Aluminum 25/25/50
Silicon Titanium Aluminum

This partial list is but a few of the many alloys we make. Each is for the specific purpose of adding quantities of high melting point metals to standard alloys.

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For Every Use

Our Telephone Number It's Buffalo Riverside 7812-3-4

NIAGARA FALLS SMELTING & REFINING CORPORATION
America's Largest Producers of Alloys
BUFFALO 17, NEW YORK

(*Continued from page* 166)

many advantages of using dry sand covering cores instead of the usual sand cope on many types of castings. Interest also was expressed in a description of the so-called Washburn riser in which a thin core with a small hole in the center is placed at the junction of the riser with the casting.

The malleable session, with about 35 attending, had John Urban, Fanner Mfg. Co., as chairman and Joseph E. Dvorak, Eberhard Mfg. Co., as discussion leader. Subjects discussed covered a wide scope, ranging from the influence of boron to the relative merits of the ventilated bottom for air furnaces. Other subjects on which experiences were exchanged included sand control, the manganese-sulphur ratio, annealing furnace linings, test bars and CO_2 indicators.

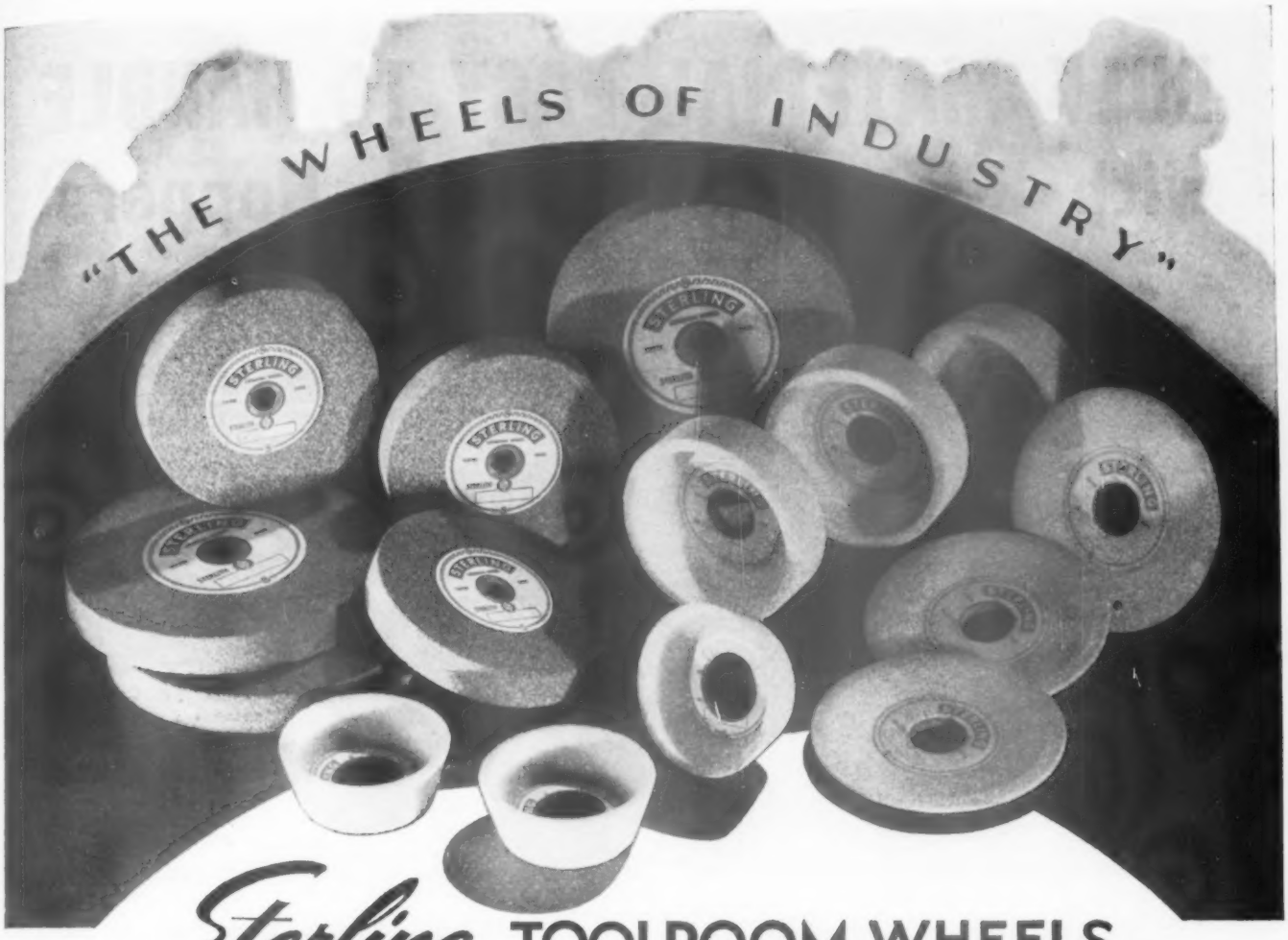
Approximately 30 were present at the session devoted to nonferrous metals and alloys over which E. J. Metzger, Wellman Bronze & Aluminum Co., and E. V. Blackmun, Aluminum Co. of America, Cleveland, presided. Mr. Metzger pointed out that, during the war, operators of brass and bronze foundries learned a great deal about producing castings in alloys with which they previously did not have much experience. Due to critical shortages of various elements and other factors such as rigid specification requirements, technical control made great headway, and it should have a strong influence in enabling the industry to produce better castings. Mr. Blackmun said that he did not believe that any startling developments had occurred in the light metal and alloy casting field because all foundries were too busy trying to get out castings, and did not have time to devote to experimental work. However, considerable knowledge was gained and put into practice for large scale production, particularly on intricate and difficult castings. Rigid specification requirements made technical control an absolute necessity, and the interchange of information between foundries aided considerably in the progress made.

Steel Men Discuss Problems

A small group attended the session on steel castings under the direction of Bruce Aiken, Crucible Steel Casting Co., and Thomas D. West, West Steel Casting Co. After a brief discussion of wartime developments such as the widespread use of inspection standards including x-ray, magnaflux, etc.; increased use of quenched and drawn steel castings treatments, and application of minimum alloying agents to meet requirements, the meeting went into a discussion of various problems. Those included ventilation of the electric furnaces; dust collecting units; maintenance costs of dust collecting systems, surface porosity, etc.

The patternmaking group under the chairmanship of V. J. Sedlon, Master Pattern Co., with Frank Cech, Cleveland Trade School, as discussion leader had for its theme "What We Have

(*Continued on page* 171)



Sterling TOOLROOM WHEELS

help change difficult jobs into easy ones

Speed up production and cut down spoilage by using the finest toolroom grinding wheels available—Sterling!

Today, toolroom grinding demands specialized wheels built to the needs of each individual job. Sterling meets this demand with wheels of proper grain size and hardness to remove stock quickly and secure desired finish.

Sterling Toolroom Grinding Wheels are used for grinding and sharpening broaches, cutters, dies, drills, gauges, hobs, reamers, cams, tools (lathe and planer), Stellite tools, etc. The smooth cutting W Sterlith grain, plus the uniform H and F bonds, does the job.

For fast cutting action on any alloy, specify the "Wheels of Industry" and be certain.

Your Best Industrial Supply Distributor Carries Sterling Wheels In Stock

Send for the Sterling Toolroom Grinding Folder it provides complete specifications for all types of jobs. It's free. Write for it.

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THE STERLING GRINDING WHEEL DIVISION

OF THE CLEVELAND QUARRIES COMPANY

TIFFIN, OHIO

THE WHEELS OF INDUSTRY

BULK MATERIAL EASY TO HANDLE with Roura Self-Dumping Hoppers!

FOUNDRIES REPORT IMPRESSIVE SAVINGS WITH THESE UNITS ORIGINATED BY ROURA

*Roura Hoppers are safe and easy to handle . . . operation is so simple that one man can manage the complete distribution and unloading job in less time than several men by the old, manual method. Users report startling savings and speed-up. When not in use, they facilitate storage . . . are all-welded, heavy-steel construction, built to last for long, hard years of rough use! Built for fork or platform trucks. *Why not try one on a 30-day trial basis?*

WRITE for New Bulletin "F" Giving Complete Specifications

FITS ANY STANDARD-TYPE LIFT TRUCK. Ruggedly-built.

LOADS QUICKLY—IDEAL FOR HANDLING BULK MATERIALS, hot or cold, wet or dry.

DUMPS EASILY—HOPPER SELF-RETURNS and LOCKS.

ROURA IRON WORKS

1405 WOODLAND AVENUE — DETROIT 11, MICH.

Get the full benefit from your tier lift trucks with Roura self-dumping hoppers

(*Continued from page* 168)

Learned in Our Industry During World War II." The subject under four headings related to machine tools, equipment, methods, and supplies. Use of the wood miller was explained by E. Pierie, Motor Pattern Co. Value of the machine includes economical construction of patterns and saving of time. S. Kozielski, Master Pattern Co. discussed the duplicating machine and the blinker system with the vertical mill, stating that the latter is an economical means of machining in the jobbing shop. L. Schmidt, Aluminum Co. of America, explained the procedure of coating pressed wood for layout work as a satisfactory substitute for steel plate.

Use of plaster for making tiremold patterns was described by Joseph Gaino, Royal Pattern Works. A report on acute shortage of pine, and the possibility that substitute woods may have to be used, was presented by H. H. Fisher, Kindt-Collins Co.

Wisconsin

REGULAR monthly meeting of the Wisconsin Chapter of the AFA was held at the Schroeder Hotel, Milwaukee, Oct. 12. A. Lebesch, Allis-Chalmers Mfg. Co., presided over the gray iron section of the meeting. He was assisted by A. M. Fisher, the Charles Jurack Co., and F. Kulka, the Motor Casting Co. E. W. Smith, Jr., works manager, Lindahl Division of the American Gear & Mfg. Co., Chicago, spoke on the subject, "Common Sense in Molding Sand Practices."

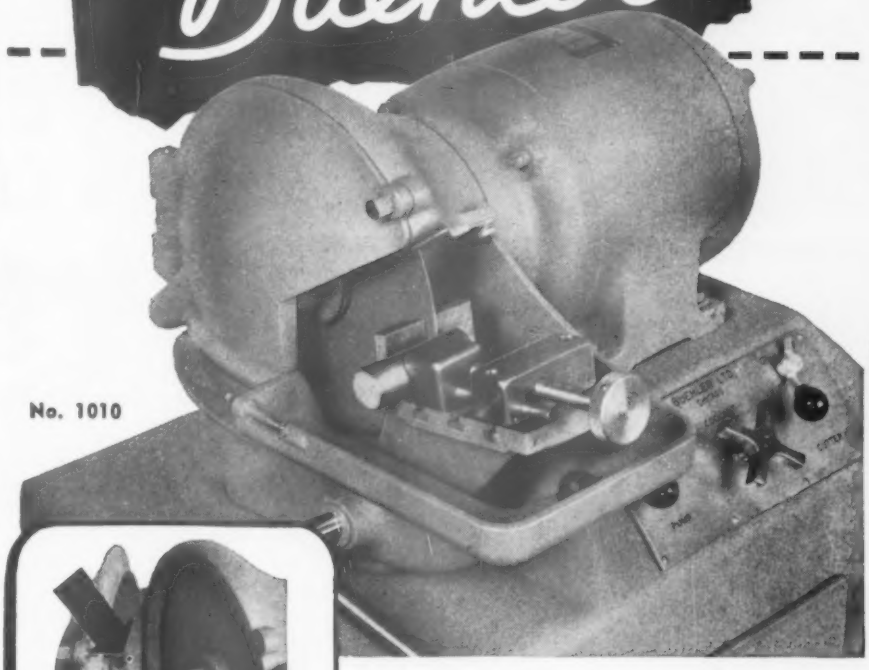
Mr. Smith, during the course of his talk, displayed samples of molding sands used in foundry. He explained in detail that by mixing some of his basic sands in predetermined proportions, he arrived at just the right sand for particular jobs. With the aid of a graphic chart, Mr. Smith emphasized the importance of uniform sand grains to control permeability.

The session of the steel section brought about some interesting and useful facts from the "middleman." The middleman was defined as the salesman who serves as an intermediator between the foundryman (production) and the buyer (casting buyer). The program was aptly labeled, "The Middleman Speaks" and was intended to acquaint the foundrymen with some of the problems encountered in bringing a pattern into the shop and holding it.

The program was very well handled by John Perry, Grede Foundries, who acted as chairman of the group. Speakers were Robert Hipke, Sivyer Steel Casting Co., who spoke on "What the Industry is Doing to Promote the Sales of Steel Castings." Mr. Hipke stressed the importance of advertising by trade paper, direct mail, and sales manual, and the fact it must not be injurious to other similar industries. Other speakers were Oscar Schildknecht, Maynard Electric Steel Casting Co., who discussed in-

(*Continued on page* 174)

Buehler



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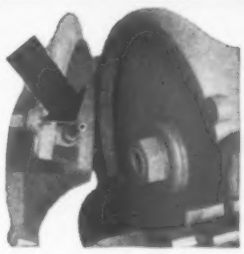

Splash guard opened showing jet pipe for coolant; a companion jet is on the opposite side of the wheel.

Complete view of cabinet showing storage bin for extra wheels and tools.

New 1 H. P.
CUT-OFF MACHINE

A laboratory size cutter with ample power for fast cutting of samples up to 1" in diameter.

This cut-off machine is built with the usual Buehler emphasis on precision in both the construction of the machine itself and the work it performs. The controls are arranged for the utmost convenience of the operator — a feature that contributes to speed and accuracy in cutting samples.

The cutting wheel mounted directly on the ball bearing motor shaft is free from side play or vibration and is cooled by a stream of coolant directed on both sides of the wheel under the guard.

The cutting is done on the front of the wheel by using the long lever handle to raise the clamp base holding the sample to contact the wheel. This mechanism is balanced so that pressure against the cutting wheel is under perfect control at all times by the operator. A metal splash guard, removed in the illustration, furnishes protection from spray.

Overall dimensions are 24" x 28" x 50".
Shipping weight, 575 lbs.

The BUEHLER line of specimen preparation equipment includes — CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • POLISHERS • POLISHING CLOTHS AND POLISHING ABRASIVES.

Buehler Ltd.
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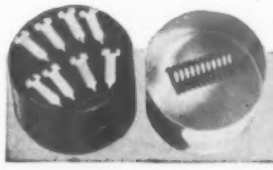
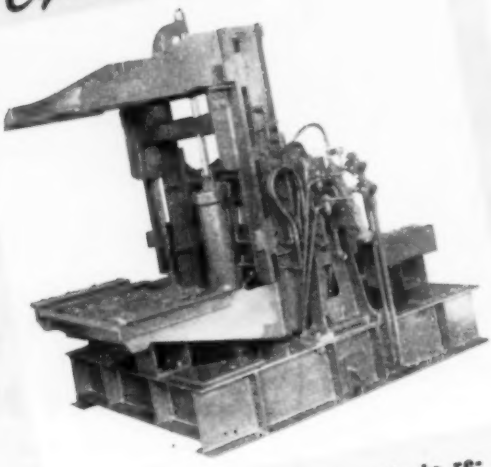
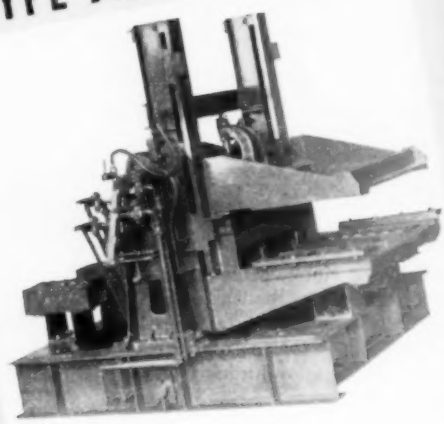


METALLURGICAL APPARATUS
165 WEST WACKER DRIVE, CHICAGO 1, ILLINOIS

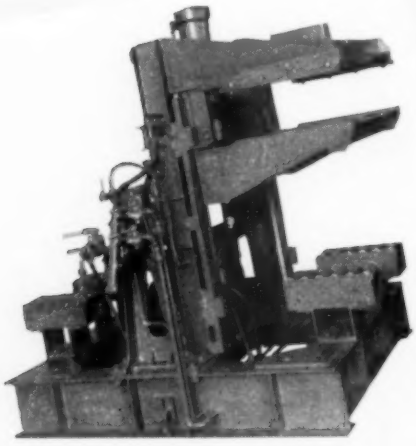
Cycle of INTERNATIONAL TYPE 'AN MACHINE



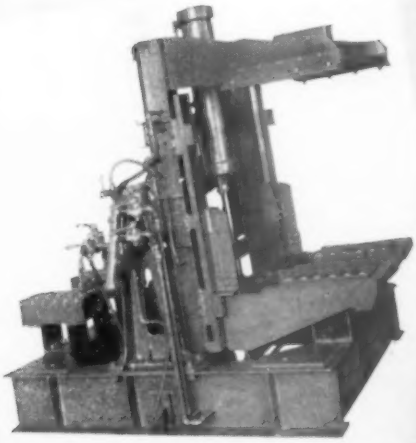
The machine is shown ready to receive the core box after it has been rammed.



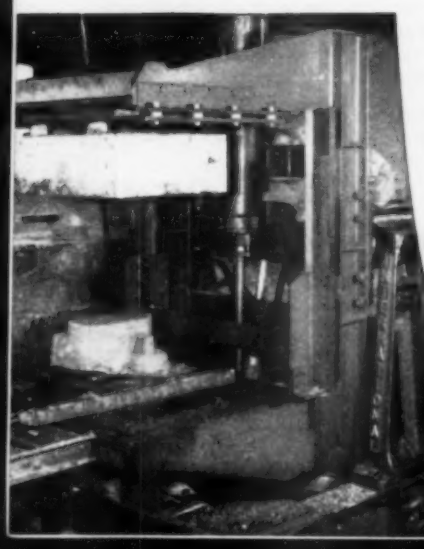
The draw frame has been moved into the position of clamping the core box and core plate.

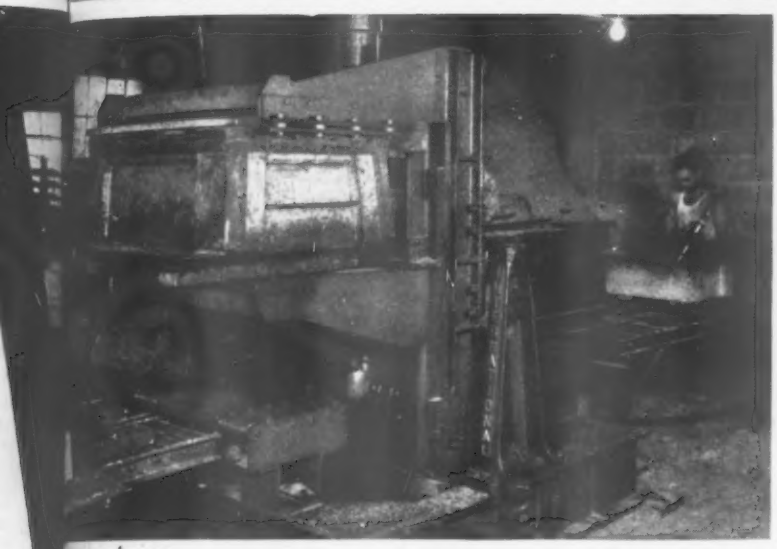


Core box has been rolled over in the clamp position.



The core and core plate have been drawn from the core box.





Hard to Draw . . . Short Run . . . Many Different Sizes of Boxes

INTERNATIONAL Type AN Machine for clamping and turning over core boxes and for drawing the core. No rigging time required. The core box is fastened to the turnover frame by sliding the cleats that have been fastened to the under side of the box into the grooves with which the turnover frame has been provided. Absolutely no adjustments are required. When boxes are changed from one size to another, irrespective of how much difference there is in the width, length and depth of boxes for which machine has been recommended, it automatically takes care of variations.

Has Air Clamp, Air Turnover, Air Draw Features. Flexibility and universal use has made the **Type AN Machine** popular. Easily adaptable to your molding problems. **Specify Internationals** and be certain of satisfaction.

INTERNATIONAL MOLDING MACHINE COMPANY 2608 WEST SIXTEENTH STREET CHICAGO 8, ILLINOIS

. . . for Many Foundry Uses

No. 101

Lights instantly without pre-heating. In 5, 15, and 20 gal. tank capacities.

You'll find a Mahr Safety Vacuum Torch on the job wherever intense, direct heat is required. You can't beat it for skin drying—it handles easily, does the job thoroughly and in a hurry.

It's also used for cupola lighting, because it throws a large, steady flame into the cupola breast opening, and gives a roaring fire quickly. And for ladle heating, any bracket or rigid support will hold torch while flame is directed into ladle.

You get complete combustion in the Mahr double chamber nozzle. Requires no pressure, since torch employs the vacuum principle—eliminating hazards of pressure torches. Burns kerosene, distillate, or low grade fuel oil.

Drying Relined Ladles

This is a convenient way to install torch for drying relined ladles, or pre-heating for pouring. Our engineers will supply you with drawings of this permanent wall-type installation. Other types also available.

Write for Bulletins on
OTHER MAHR PRODUCTS

Annealing furnaces
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Torches for skin drying and cupola lighting
Crucible melting furnaces for non-ferrous metals
Ladle heaters and dryers
Burners . . . . Blowers

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ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

MAHR MANUFACTURING CO.
DIVISION OF DIAMOND IRON WORKS, INC.
1709 North 2nd St., Minneapolis 11, Minn.

(*Continued from page* 171)

spection standards and requirements; George Sherr, Wehr Steel Co., "Alloys and Heat Treatment"; Allen Schlicter, Pelton Steel Casting Co., "The Cost of a New Customer." Mr. Schlicter finished his talk with, "The first order is up to the salesman; the second order depends upon the foundryman."

John Wilkinson, Falk Corp., was the last speaker and his topic was "Post War Outlook." The opinion here was that when we settle down to peacetime products, the outlook should be very good for some years to come, depending on the product turned out by the foundrymen.—*Walter Gerlinger, publicity chairman.*

Southern California

YOU'RE in this business to make money, not castings. Don't take jobs somebody else can do cheaper than you can. Let the other fellow cut prices foolishly. He'll be cutting his own business throat when he does it."

With this salty and figurative approach, Carleton B. Tibbetts, vice president and general manager, Los Angeles Steel Casting Co., keynoted a talk on cost records before the monthly meeting of the Southern California Chapter of AFA at the Elks Club, Los Angeles, Nov. 9.

Mr. Tibbetts said he is convinced that one-third of all castings are overpriced, another third are underpriced, with the remaining third only fairly priced.

Recommending the AFA cost system to his listeners "as a basis for working out the method best suited to your own foundry," he emphasized that the chart system of cost analyses from a historical standpoint has many advantages.

"Pick an average ten-year tonnage to aim at," he said. "Then work out a plan to distribute your costs over that period. Analyze your production capacity in terms of human skills and machines available to you. Then limit yourself to the size and type of castings that can be produced best and most economically with what you have.

"Above all, don't bite off too much under the misapprehension that more castings mean more money. They don't. They can mean just the opposite unless you know your costs and stay within their structure.

"Plant expansions take place by planes, not by gradual, even expansion rates. When you've reached your capacity on one level, don't try to jump to the next without preparation. You may be caught between levels where your mounting costs outweigh your increased production."

Mr. Tibbetts hinted that perhaps some form of profit sharing plan ultimately may become the answer to current and continuing labor difficulties. He did not expand the idea.

New members of the chapter were announced by President Robert R. Haley as follows:

R. J. Wallace, Westlectric Steel Castings Inc.; George V. Peake, Pattern Service Co.; W. A. Ashman, Atkins, Kroll Co.;

(*Continued on page* 176)

VOLCLAY BENTONITE

NEWS LETTER No. 11

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

PROLONG THE LIFE

OF RAMMED LININGS

OF LADLES AND FURNACES

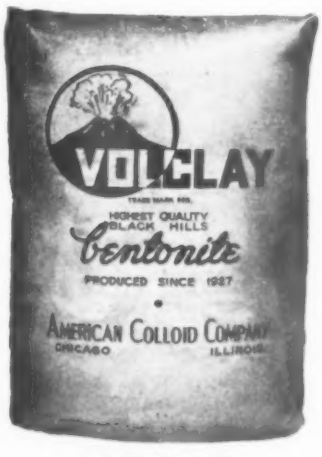
Using VOLCLAY, silica flour and graded ganister, steel foundries have prolonged the service life of ladle linings, without patching, MORE THAN 500%, compared to former practice.

In steel convertors, the same mix is showing 100% improvement over the old mix.

The VOLCLAY-silica flour combination reacts to produce a dense ceramic bond with high resistance to slag and metal penetration.

The fusion temperature of the mix approaches 3092°F, a higher figure than a fire-clay and ganister mix.

Electric furnace bottoms may also be given longer life by using the VOLCLAY-silica flour-ganister mix.



Western Bentonite

The above practice has developed from the good results reported in A. F. A. paper "CONVERTOR REFRACTORIES" by Wm. C. Cress. Read that very interesting paper in A. F. A. Transactions, Vol. 52, 1944, pages 854-870.

A review of the above article, with the essential data, formulas, etc. appears in our new Bulletin No. 242. It also contains other information on Foundry Refractories. Ask your VOLCLAY dealer for a copy or write to us. It's free.

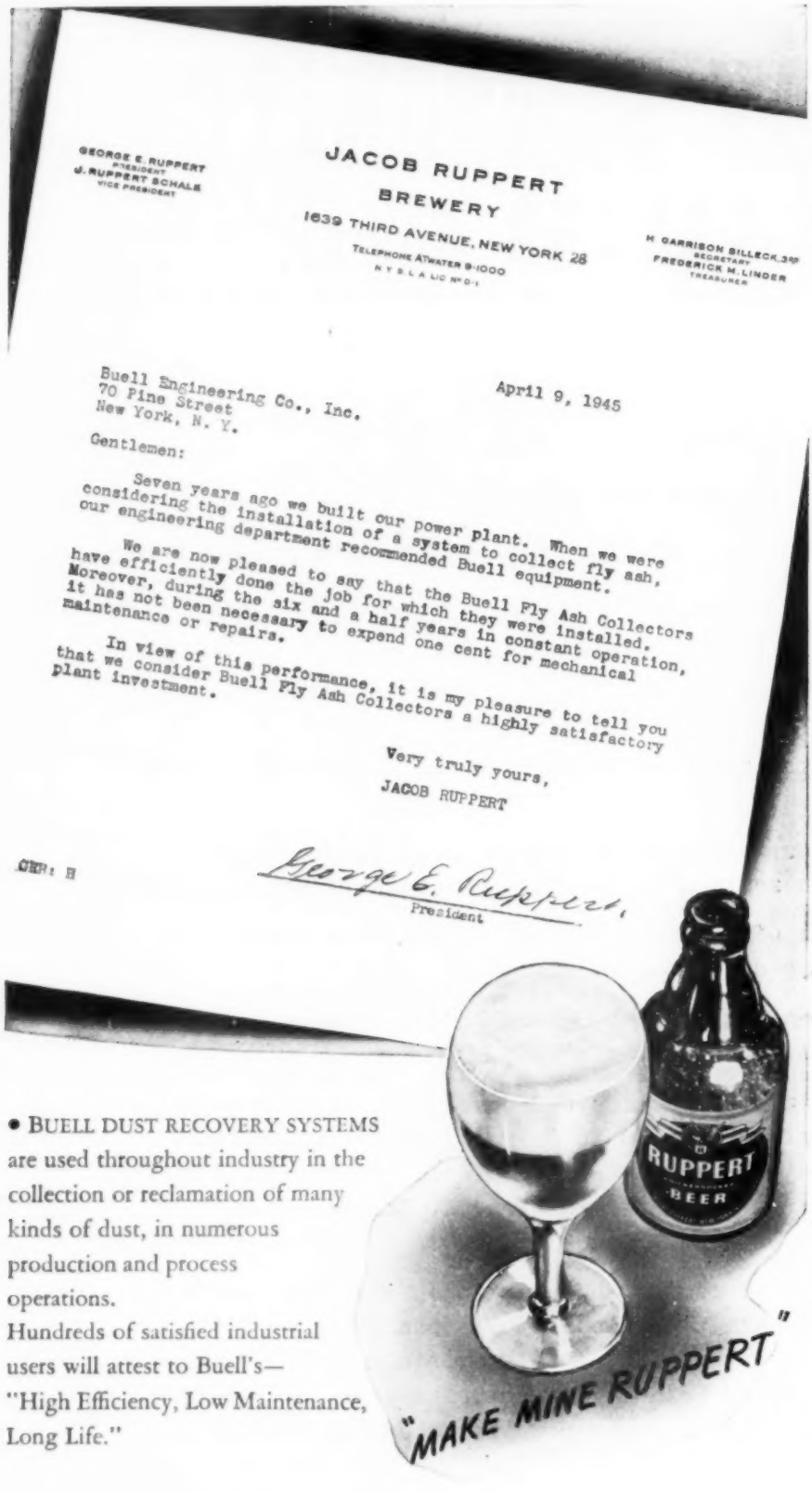
VOLCLAY BENTONITE

HAS SERVED FOUNDRIES FOR 15 YEARS!

AMERICAN COLLOID COMPANY

363 WEST SUPERIOR STREET • CHICAGO 10, ILLINOIS

Producers of Volclay and Panther Creek Bentonite



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SECRETARY
FREDERICK M. LINDER
TREASURER

April 9, 1945

Buell Engineering Co., Inc.
70 Pine Street
New York, N. Y.

Gentlemen:

Seven years ago we built our power plant. When we were considering the installation of a system to collect fly ash, our engineering department recommended Buell equipment.

We are now pleased to say that the Buell Fly Ash Collectors have efficiently done the job for which they were installed. Moreover, during the six and a half years in constant operation, it has not been necessary to expend one cent for mechanical maintenance or repairs.

In view of this performance, it is my pleasure to tell you that we consider Buell Fly Ash Collectors a highly satisfactory plant investment.

Very truly yours,
JACOB RUPPERT

CWH: H

George E. Ruppert
President

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BEER

"MAKE MINE RUPPERT"

• BUELL DUST RECOVERY SYSTEMS are used throughout industry in the collection or reclamation of many kinds of dust, in numerous production and process operations.
Hundreds of satisfied industrial users will attest to Buell's—
"High Efficiency, Low Maintenance, Long Life."

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DUST RECOVERY SYSTEMS

BUELL ENGINEERING COMPANY, INC.
14 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

(*Continued from page* 174)

J. W. D. Griffith, Independent Foundry Supply Co.; Jack E. Patterson, Brumley-Donaldson Co.; H. C. Warren; R. V. Sloan, Independent Foundry Supply Co.; Steven Mocsny, Independent Foundry Supply Co., and E. R. Boylan, Eld Metal Co.—*Maurice Beam.*

Central Indiana

AT THE Nov. 5 meeting of the Central Indiana Chapter of AFA, E. C. Troy, chief metallurgist of the Dodge Steel Co., Philadelphia, discussed "Molding and Core Room Sands," and concretely pointed out that fundamentally there is no sand control in the foundry but that it existed in name only, principally because the foundries themselves do not know what properties they want in sand.

Some standards have been set where results have indicated reliability and these are adhered to as closely as possible. Much stress in the past has been laid on high permeability and low moisture content of sand in the production of quality steel castings, but Mr. Troy stated that these ideals are not entirely correct, for in their shop with sands that were very low in permeability and with moisture contents up to 6 per cent, they consistently obtained small castings free from the defects commonly associated with low permeability and too high moisture. Some experiments conducted on coreroom practice were reviewed with the aid of lantern slides which brought out some very interesting observations on various core mixes.

Fred Kurtz, metallurgist, Electric Steel Castings Co., Indianapolis capably served as technical chairman of this very interesting presentation.—*B. P. Mulcahy, historian.*

Saginaw Valley

SAGINAW Valley foundrymen gathered at Frankenmuth, Mich., Nov. 1 to hear Fred G. Sefing of the Research and Development Division, International Nickel Co., discuss "Molding Methods for Sound Castings." Mr. Sefing confined his talk to an illustrated discussion of the fundamentals which he asserted could be applied to any type of metal being cast. Among these are:

1. Take adequate steps to get clean metal into the casting.
2. Plan to feed the casting in such a manner that controlled directional solidification is obtained.
3. Provide ample risers and feed heads to assure feeding of metal to the casting until solidification takes place.
4. Use risers of sufficient height to provide plenty of pressure to feed out the last viscous or sluggish metal into the casting as the metal temperature falls.

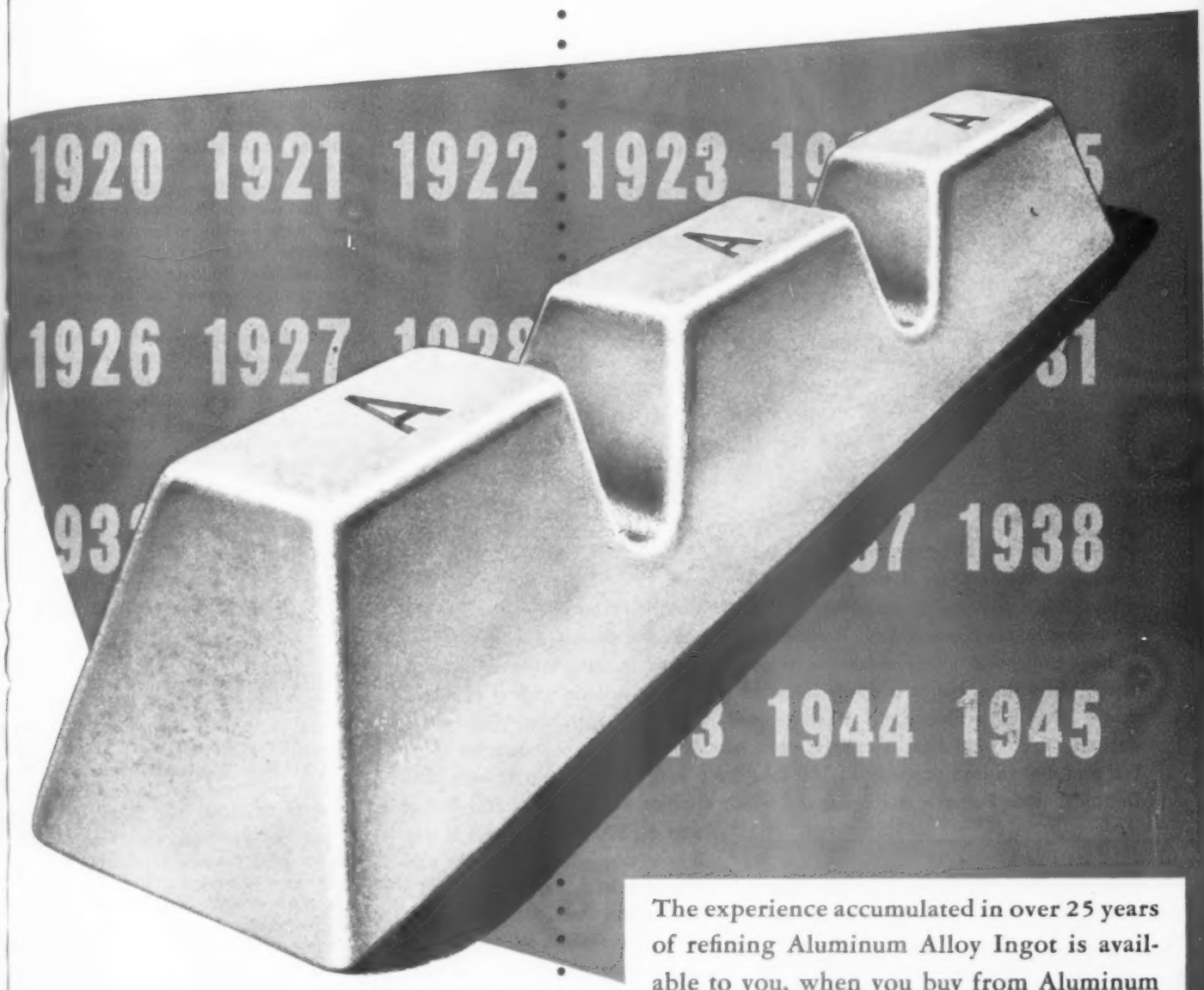
Each of these fundamentals was discussed in detail, and the various devices employed in their application were illustrated.

Mr. Sefing advised jobbing founders

(*Continued on page* 178)

TIME-TESTED SOURCE

For ALUMINUM ALLOY INGOT!



The experience accumulated in over 25 years of refining Aluminum Alloy Ingot is available to you, when you buy from Aluminum Refiners. Our plant facilities and equipment are the most modern available. Thus you are assured a source of supply with both the knowledge and the ability to turn out Aluminum Alloy Ingot that will meet both your specifications and your delivery requirements. Let us quote on your next order.

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Division of

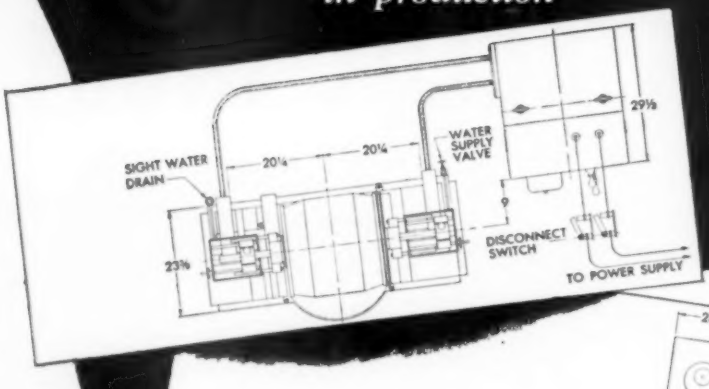
BOHN ALUMINUM & BRASS CORPORATION · Detroit 26, Michigan

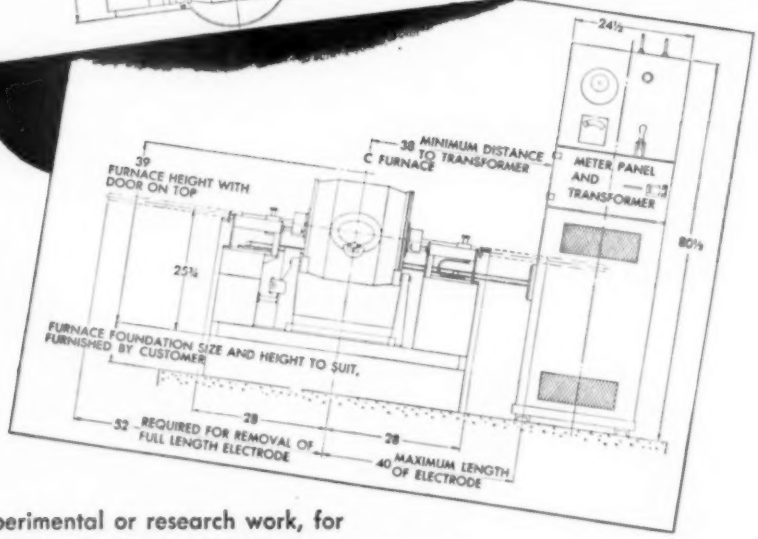
General Offices, Lafayette Building

MANUFACTURERS OF ALL TYPES AND SHAPES OF CASTING AND DEOXIDIZING ALLOYS

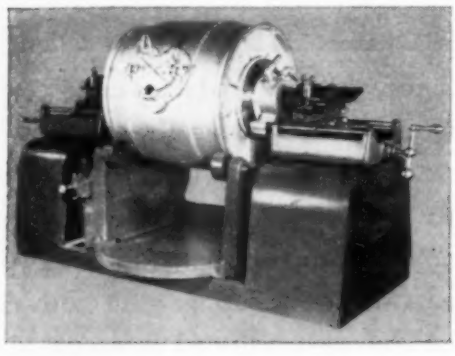
NEW LABORATORY ELECTRIC FURNACE

Helps insure metallurgical control in production





FOR experimental or research work, for running pilot heats, for developing or testing new alloys, it will pay you to use a Detroit Rocking Electric Furnace either arc or resistance types. These compact units are designed with a crock and cover lining which is available in alundum, magnesite, sillimanite, zircon, or carbon, hence is easily adapted for testing a wide variety of mixes. Spare interchangeable shells may be used if different refractory linings are desired. Even with their relatively small nominal cold charge capacity of 60 lbs. and molten iron capacity of 100 lbs., these fast, flexible units have typical Detroit Electric Furnace melting speed which enables them to melt 600 lbs. of iron or 800 lbs. of brass in one 8-hour day. Thus, they are suitable for both experimental and production work. Simple installation requirements. Write for complete information on how the type GMS or type GMSR and other Detroit Rocking Electric Furnaces will help you obtain improved quality and lower production cost.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 176)

to forget about good melt figures when attempting to make the first good casting, and to concentrate on doing whatever is necessary to make the first casting sound. Trimming down and experimenting can always follow after the first good casting is made, he said.

He also discussed the design of castings with respect to their soundness. Foundrymen were urged to offer designing engineers constructive criticisms of designs to promote ease of casting and lower cost both to the foundry and to the customer. The speaker emphasized in closing that the whole future of the foundry business hinges around the making of *sound* castings.

The coffee talker was Dr. J. D. Hanawalt, director of the metallurgical department, Dow Chemical Co. Dr. Hanawalt described industrial and social conditions in Germany as he saw them during his recent trip overseas. He quoted liberally from his personal diary in which he had recorded the text of his conversation with leading industrialists and other civilians. He also discussed scenes at Dachau and Buchenwald. With but one exception, Germans felt no war guilt, he stated.

Dr. Hanawalt concluded that the lesson to be learned from Germany's rise and fall should be for us to be on guard here in our own country to prevent any individual or group from taking the law into its own hands. The next meeting of the Saginaw Valley Chapter is scheduled for Dec. 6, when H. E. Baughman of Wheeling Steel Corp. will speak on "Coke and By-Products."—*Joseph J. Clark, publicity committee.*

Eastern Canada and Newfoundland

THE first fall meeting of the Eastern Canada and Newfoundland Chapter of the AFA was held Oct. 12 at the Mount-Royal Hotel, Montreal. The subject was "Centrifugal Casting", presented by Nathan Janco, Centrifugal Casting Machine Co., Tusa, Okla.

Mr. Janco's reputation as an authority on his subject was evident from the large number in attendance and from the very spirited question period which followed the formal paper. The speaker traced the history of centrifugal casting from the familiar cast iron pipe of some few years ago up to today when castings of numerous types are made by this method.

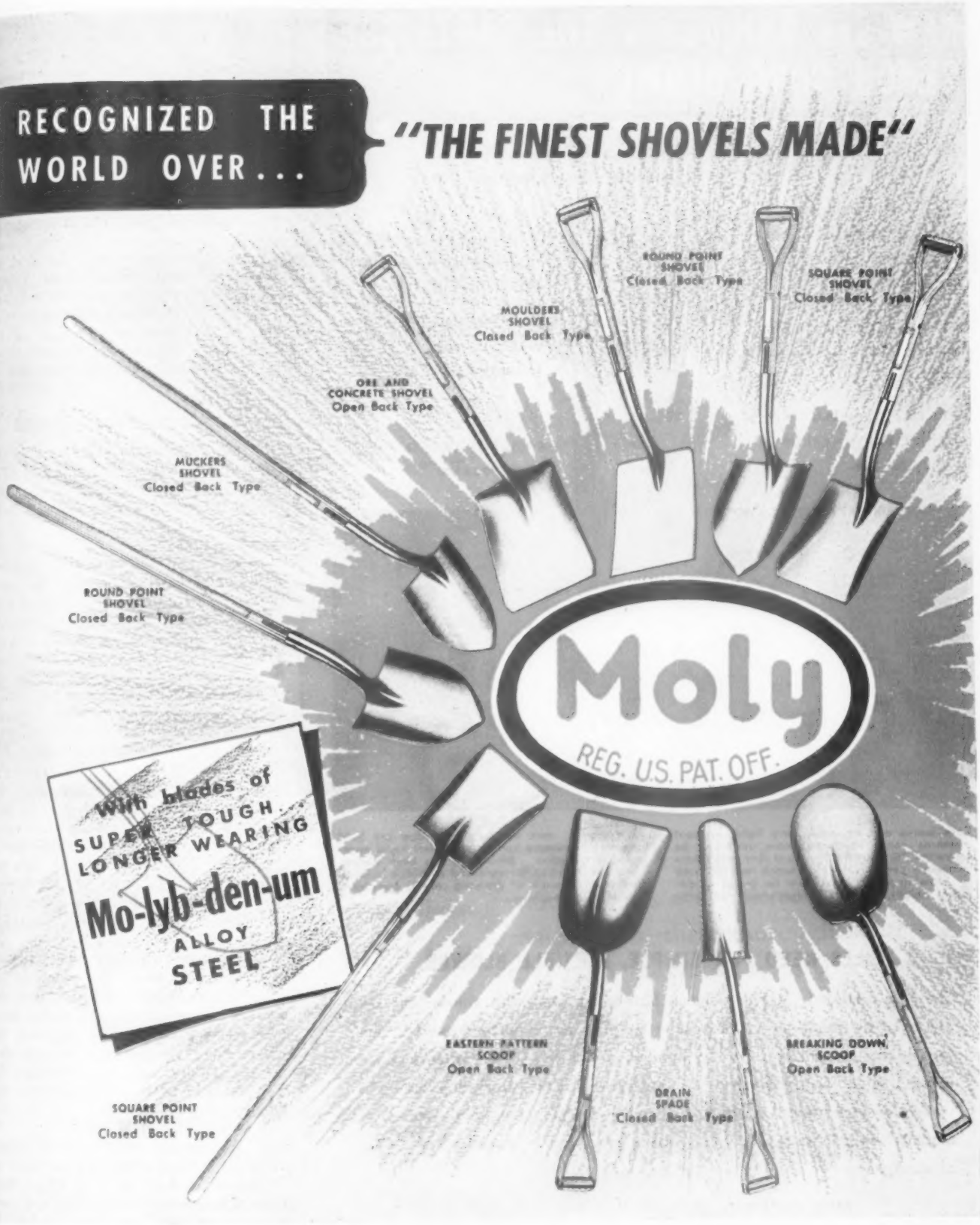
Mr. Janco dealt at length with the design of centrifugal machines of both the vertical and horizontal types for making castings in a wide range of sizes. During the course of his talk the speaker explained that this method of casting could be applied to almost any metal including highly alloyed steel with high shrinkage characteristics and most of the nonferrous alloys.

The recent national AFA apprenticeship contest in patternmaking and mold-

(*Concluded on page* 180)

RECOGNIZED THE WORLD OVER . . .

"THE FINEST SHOVELS MADE"


ROUND POINT SHOVEL Closed Back Type
SQUARE POINT SHOVEL Closed Back Type
MOULDERS SHOVEL Closed Back Type
ORE AND CONCRETE SHOVEL Open Back Type
MUCKERS SHOVEL Closed Back Type
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With blades of SUPER TOUGH LONGER WEARING
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WOOD SHOVEL AND TOOL CO. PIQUA OHIO

A NATIONAL ORGANIZATION *SPECIALIZING EXCLUSIVELY* IN SHOVELS, SPADES AND SCOOPS

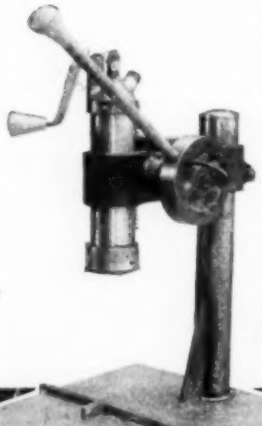
NEW and UNIQUE! » THE CARTRIDGE BENCH CORE BLOWER

*Users report remarkable increases in quality and quantity of production

Produces variety of intricate cores with unusual speed and simplicity.

Comes ready to use—virtually no installation cost.

Can be operated with unskilled labor—extremely easy to use.



If you make cores 2 lbs. or under—this unit ideally suited to your use.

Designed by two practical foundrymen.

WRITE for complete details and new booklet

Core boxes can be made very light, in most instances bench equipment now used can be converted for blowing. Almost any sand now commonly used on the core bench may be used for blowing cores. Adjustment for boxes of different height, size and shape made instantly.

To operate, core box and cartridge are held down by pressure handle while left hand operates blow valve. After core has been blown, the box is pulled forward and cartridge is lifted off and the work of drawing core is completed on base of machine.

FILLS NEED FOR SIMPLE, FLEXIBLE BLOWER

The New *Redford Cartridge Bench Blower* has met with enthusiastic acceptance by foundrymen because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 8 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in seven additional standard sizes and special sizes furnished where needed.

★ Cartridge Bench Core Blowers

Redford IRON & EQUIPMENT CO.

Phone: REdford 8610

21315 West McNichols Rd. Detroit 19, Michigan

(*Concluded from page* 178)

ing was the first occasion that Canadian foundry apprentices participated in this competition, and they were rewarded for their efforts by winning several prizes. E. Doucet, Canadian National Railways, Montreal, took first prize in gray iron molding. P. Crevier, Canadian Car & Foundry, Longue Pointe, took second prize in steel molding. H. Lalonde, Montreal Foundry, took third prize in gray iron molding. D. MacKenzie took third prize in pattern-making. The chapter feels proud of the efforts of these boys and their winning speaks well for the training received, not only in their respective plants but also for the untiring efforts of the chapter's Educational Committee. — *G. D. Turnbull, publicity chairman.*

Western New York

REGULAR monthly meeting of the Western New York Chapter, AFA, was held Oct. 5 at Hotel Touraine, Buffalo, N. Y., with 106 members and guests in attendance. Chairman Arthur H. Suckow presided.

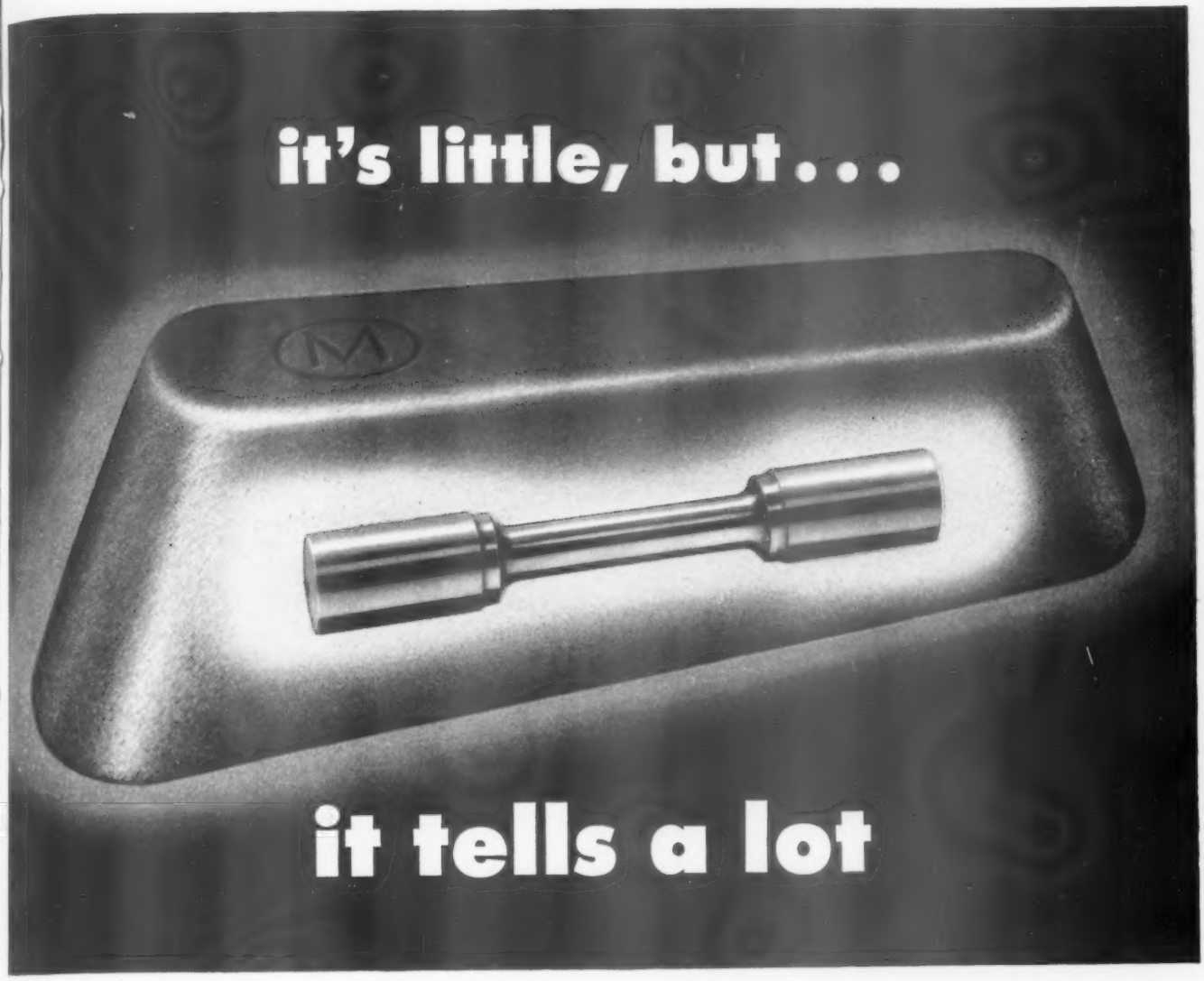
Henry C. Winte, technical chairman for the meeting, presented the guest speaker, Stuart F. Arnold, National Carbon Co., Niagara Falls, N. Y., whose subject was "Industrial Organization." Mr. Arnold explained that his subject dealt to a large extent with the relationship of human beings and that the human factor must be taken into consideration in building an organization, and must be thoroughly appreciated to develop a smooth-running, efficient organization in which personnel is happy in its work. He stated that the organization must be built to fit the particular enterprise. Such a thing as a permanent organization chart is not practicable. It is better to have the chart drawn up in pencil so that changes may be readily made as the organization is "tailored" to the personnel selected to do the job.

Emphasizing many of the important and especially interesting points of his subject with blackboard diagrams, the speaker elaborated upon the various functions of organization, management, administration, systems and records, and pointed out the differences between the two principal types of organization, the military or line type and the line and staff type. "The ideal type of organization," Mr. Arnold said, "is one in which decisions are permitted to be made at the lowest level of authority, where there exists a knowledge of the facts and competence to make decisions."— *Leo A. Merryman, secretary.*

Hear Discussion on Patternmaking

Over 50 members and guests attended the first technical meeting of the Pattern Manufacturers Group, Associated Industries, Cleveland, for the 1945-46

(*Concluded on page* 182)



This test bar cast from each heat of Ingot metal produced in Michigan Smelting and Refining plants is a highly important step in turning out good alloy Ingot.

These tests assure that the physical properties of the alloy Ingot are in accord with your specifications. Supplementing the Spectrograph which reveals every element in alloy composition, these thorough laboratory and physical tests are your assurance that Michigan Smelting and Refining alloy Ingot will do the job for you for which it was designed. Let us prove our ability to satisfy you on your next order.

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NON-FERROUS SCRAP METAL REFINERS FOR 50 YEARS

DUST COLLECTION

. . . from small air volume . . .

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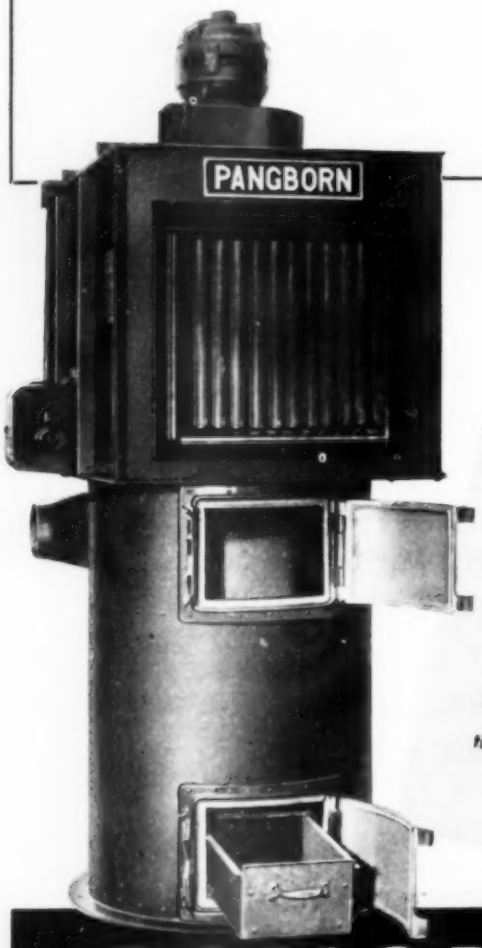
Into one self-contained unit, Pangborn has engineered many of the design features that it has developed during 40 years of experience in dust control.

The new industrial "CK" type Unit Dust Collector occupies minimum floor space . . . is flexible in arrangement to permit adaption to a variety of field conditions . . . and is easily accessible for inspection and servicing. Minimum piping and installation expense.



Write us for Bulletin 910, describing such other features as two-stage separation which minimizes filter surface wear. Address: Pangborn Corporation, Hagerstown, Md.

PANGBORN

World's Largest Manufacturer of Dust Control and Blast Cleaning Equipment

(*Concluded from page* 180)

season. Meeting was held at Hotel Statler on Oct. 23 and Chairman V. J. Sedlon, Master Pattern Co., presided. He introduced J. E. Fintz, assistant superintendent in charge of vocational education, Cleveland Public Schools, and C. D. Madigan, Pattern Makers' Union, who spoke briefly, and Frank Cech, Cleveland Trade School, who presented a resume of the procedures in local and national pattern contests. Jack Parker, Motor Pattern Co., Cleveland, presented in behalf of the group the awards to prize winners in the local pattern contest. These were Steven Krajny, Master Pattern Co., first; Robert A. Cech, Cleveland Trade School, second; Edward Jedlicka, East End Pattern Works, third.

Mr. Sedlon then spoke briefly on apprenticeship, explaining the development of apprentice interest by the group since 1930, and the progress that has been made. He then presented certificates of completion of the Federal Area Training Service to the following: Thomas Allen, Alvin Beamish, Robert Clifford, Charles Dickey, John Gaino, Barthold Holdstein, Joseph Jasko, Edward Kollar, Stanley Merar, Edward Milner, Henry Osawski, Richard Pelka, Norman Roberts, Frank Salamon, George Spirhanzl, and Arthur Walsh.

Principal speaker of the evening was A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee, who was introduced by George Gedeon, Aluminum Co. of America, Cleveland. Mr. Pfeiffer pointed out the difficulty in visualizing the completed pattern and casting from the engineer's drawings, and showed how by use of scale sectional models that trouble was overcome. He also pointed out the necessity of collaboration between engineer or designer, patternmaker and foundryman to obtain the most economical procedure. Consultation between the three before completion of the drawings usually results in slight changes which mean the difference between easy and complicated production methods.

Mr. Pfeiffer in his discussion also mentioned that pattern changes to bring them into conformity with present-day practices pays good dividends, and showed a number of examples of "before and after" with data on the difference in castings production costs as well as that for making the change in pattern. He also showed numerous views of and described patternmaking procedures at Allis-Chalmers Mfg. Co.

Arrange Conference On Electric Steel

Third annual conference on electric furnace steel sponsored by the Electric Furnace Steel Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, will be held at Hotel Statler, Cleveland, Dec. 4-5. Local committee on arrangements includes Charles W. Briggs, Steel Found-

(*Concluded on page* 185)

Workers like the lighter weight of

Mount your patterns on lightweight magnesium match plates and see how favorably your molders respond. Those pounds saved mean that less labor need be expended on useless lifting. The work is easier. There's less fatigue slump during the day.

Where magnesium is used in match plates, core boxes, and jigs and fixtures, weights are often held within legal limits for women workers. This simplifies your labor problems.

Let us help you determine how you can save time and money by employing lightweight Mazlo Magnesium Alloys. Aluminum Company of America, Sales Agent for American Magnesium products, 1720 Gulf Building, Pittsburgh 19, Pa.

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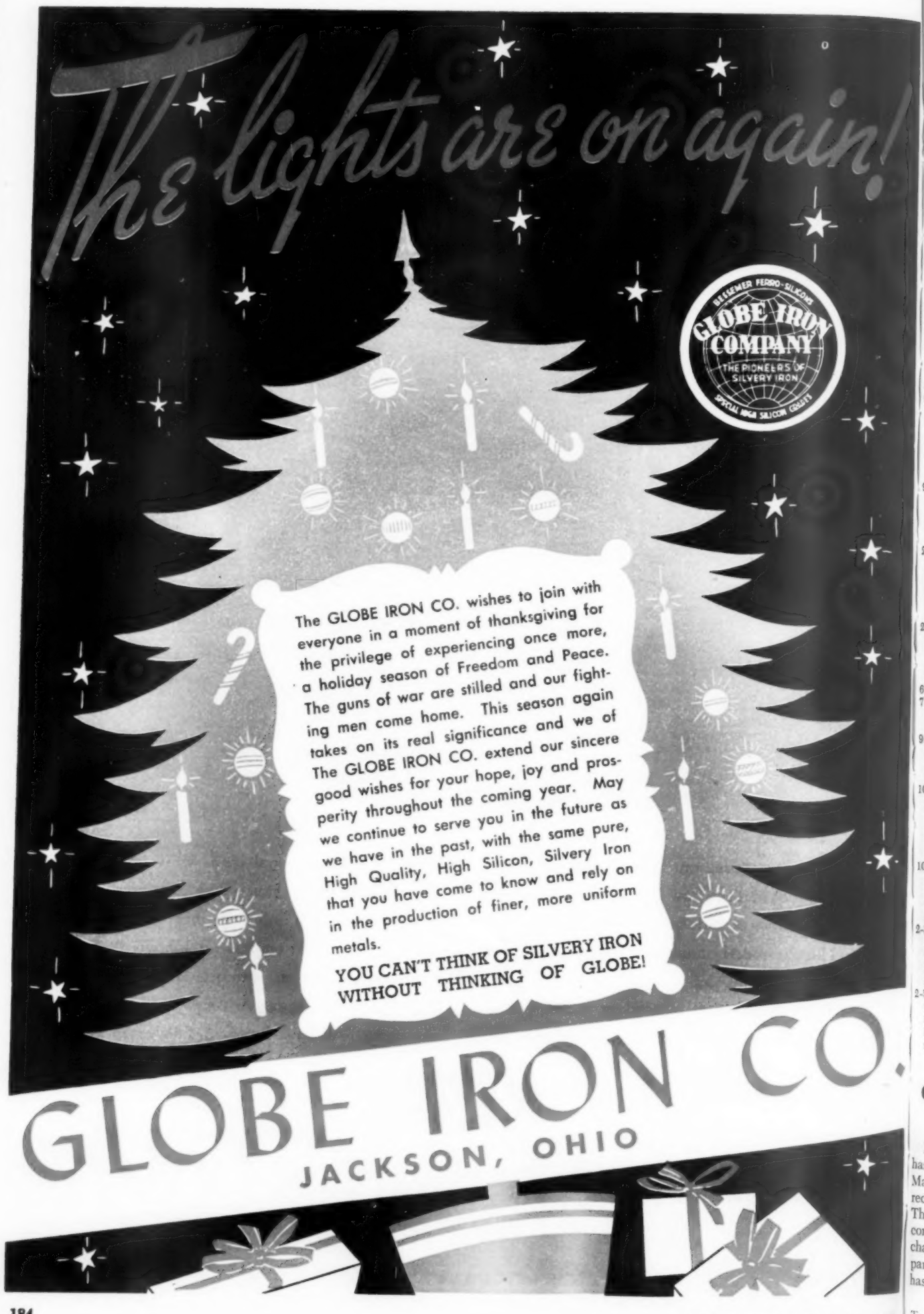
The lights are on again!
BESSEMER FERRO-SILICONS
GLOBE IRON COMPANY
THE PIONEERS OF SILVERY IRON
SPECIAL HIGH SILICON GRADES
The GLOBE IRON CO. wishes to join with everyone in a moment of thanksgiving for the privilege of experiencing once more, a holiday season of Freedom and Peace. The guns of war are stilled and our fighting men come home. This season again takes on its real significance and we of The GLOBE IRON CO. extend our sincere good wishes for your hope, joy and prosperity throughout the coming year. May we continue to serve you in the future as we have in the past, with the same pure, High Quality, High Silicon, Silvery Iron that you have come to know and rely on in the production of finer, more uniform metals.
YOU CAN'T THINK OF SILVERY IRON WITHOUT THINKING OF GLOBE!
GLOBE IRON CO.
JACKSON, OHIO

(*Concluded from page* 182)

ers' Society of America, as chairman; K. L. Fetters, Youngstown Sheet & Tube Co., Youngstown; H. W. McQuaid, Republic Steel Corp., Cleveland; W. J. Reagan, Copperweld Steel Co., Warren, O., and Gilbert Soler, Timken Roller Bearing Co., Canton, O.

First sessions on each of the two days will be devoted to joint discussions of acid and basic electric furnace practice, while the afternoons will have separate sessions on acid and basic practices. Reception and annual dinner will be held Tuesday evening, Dec. 4 with C. H. McCrea, National Malleable & Steel Castings Co., Cleveland, as toastmaster, and J. F. Lincoln, Lincoln Electric Co., Cleveland, as principal speaker. Tentative program for the 2-day meeting follows:

Tuesday, Dec. 4

8:30-9 a.m.—Registration.
9:15-9:30 a.m.—General Session.
Welcoming remarks by C. W. Briggs, chairman, Committee for Third Annual Conference.
Response by H. W. McQuaid, chairman, Electric Furnace Steel Committee.
Announcements and reports.
9:30-12:15—Joint Technical Session.
Ideal conditions for fast melting—Chairman, S. D. Gladding, Bethlehem Steel Co., Bethlehem, Pa.; Co-chairman, John Juppenlatz, Lebanon Steel Foundry, Lebanon, Pa.
2-5 p.m.—Basic Steel.
Ladles and pouring practice—Chairman, C. R. FonDersmith, American Rolling Mill Co., Middletown, O. Co-chairman, L. D. Hower Jr., Carnegie-Illinois Steel Corp., Duquesne, Pa.
2-5 p.m.—Acid Steel.
Furnace and ladle linings—Chairman, C. C. Spencer, Electric Steel Casting Co., Indianapolis. Co-chairman, R. P. Heuer, General Refractories Co., Philadelphia.
6:15 p.m.—Reception.
7 p.m.—Annual Dinner.

Wednesday, Dec. 5

9:30-10:30 a.m.—Joint Technical Session.
New methods of temperature measurement—Chairman, R. B. Sossman, U. S. Steel Corp., Kearny, N. J.
10:30-12:15 p.m.—Basic Steel.
Economical production of alloy steels—Chairman, H. F. Walther, Timken Roller Bearing Co., Canton, O. Co-chairman, T. J. McLoughlin, Carnegie-Illinois Steel Corp., Pittsburgh.
10:30-12:15 p.m.—Acid Steel.
Operations—Chairman, Charles Locke, West Michigan Steel Foundry Co., Muskegon, Mich. Co-chairman, E. H. Weak, American Steel Foundries, East Chicago, Ind.
2-5 p.m.—Basic Steel.
Stainless Steel—Chairman, W. M. Farnsworth, Republic Steel Corp., Canton, O. Co-chairman, C. A. Scharschu, Alleghany-Ludlum Steel Corp., Brackenridge, Pa.
2-5 p.m.—Acid Steel.
Operations—Chairman, E. C. Troy, Dodge Steel Co., Philadelphia. Co-chairman, F. B. Eiseman, Ross-Meehan Foundries, Chattanooga, Tenn.

Opens Birmingham Branch Office

Robins Conveyors Inc., Passaic, N. J., has opened new offices in the Brown-Marx bldg., Birmingham, under the direction of Charles A. Thompson. Mr. Thompson held the rank of lieutenant commander in the Navy until his discharge Oct. 15, C. B. Davis, the company's Birmingham agent since 1916, has retired from business.

and CORTLAND GRINDING WHEELS do their job well!

The right wheel for the job is the one sure way to get maximum production at lowest cost. Cortland Engineers use this as the basic rule governing their wheel recommendations.

Of course, you can go through a series of tests yourself to check wheel requirements (we at Cortland welcome comparative tests against competitive products) or Cortland Engineers will gladly give you the benefit of their knowledge and experience, and save you the trouble. Either way you'll be able to profit fully by the rapid stock removal, longer wheel life and cooler grinding action of Cortland Grinding Wheels.

You'll get a helpful reply when you write to

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CORTLAND GRINDING WHEELS CORP.
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Chester Mass.

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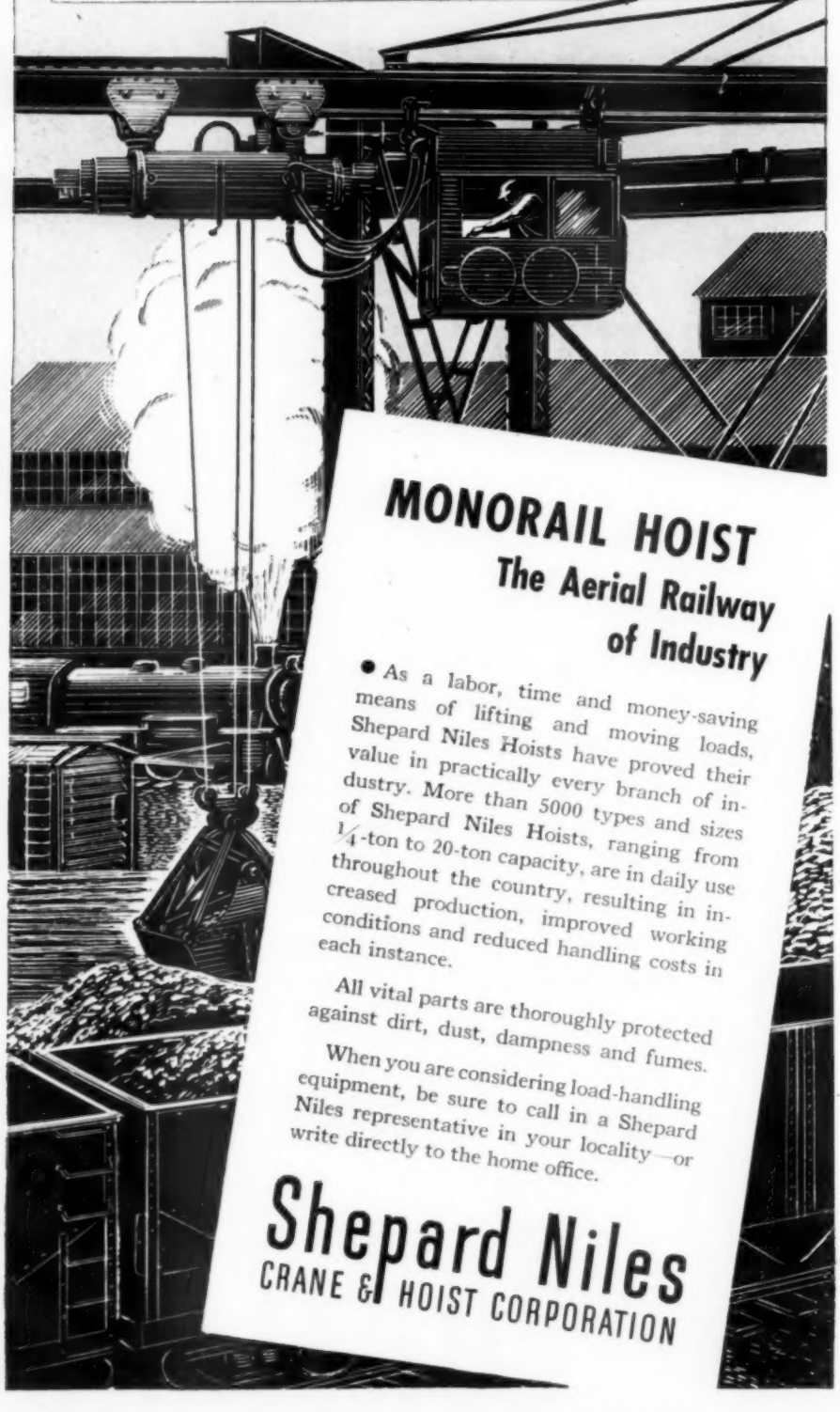

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RESEARCH AT WATERTOWN

(*Continued from page* 106)

vision, the Arsenal production department also includes a carriage division and gun division. The carriage division handles machining operations on not only the carriages, cradles and other parts that make up a complete gun, but also on the barrels produced by the gun division. Principal products turned out at Watertown during the war, in addition to barrels of various sizes, included 90-mm anti-aircraft guns, 37-mm carriages, and cradles, 16-inch seacoast guns, 240-mm carriages with recoil mechanisms and equilibrators, 240-mm shells, and recoil mechanisms for the 8-in. howitzer.

As previously indicated, research work of the Arsenal involves other forms of ferrous metals than castings; a large part of its wartime investigations concerned armor plate, its development, application and fabrication, in addition to gun tubes and shells. One of its accomplishments was the development of a method of welding tank armor in order to eliminate the use of rivets that could be shattered by shell fire. The laboratory department had a staff of 150 to 200 during the past few years, recently under the direction of Lt. Col. Norman A. Matthews, who has been associated with the Arsenal since 1940. The process metallurgy section of this department handles studies of casting and heat problems.

Operates Experimental Foundry

Facilities for investigation of gun casting technique include a well equipped experimental foundry. This unit, now housed in a wing of a new foundry building erected in 1941, is provided with eight high-frequency induction furnaces of 50 to 1000-lb melting capacity, a centrifugal machine for casting 40-mm gun tubes, a vertical gas-fired heat treating furnace, and water and oil quench tanks. While the centrifugal method of casting is relatively old and was well established in other fields before Watertown Arsenal considered its adoption, many problems had to be overcome before the process proved successful in meeting the rigid specifications applying to guns. Even during the period since the method was proved practicable, studies have been going on seeking further improvements and refinements.

Various phases of production practice offer opportunity for investigation. Each casting machine has its separate induction furnace for melting carefully selected steel, the charge consists of 2-in. square bars of plain carbon steel of low carbon content with suitable ferroalloys added to obtain required analysis of gun tube. The melting furnace serves also as a ladle, being picked up by an overhead crane and placed on a tipping car that operates on a track leading to the end of the centrifugal machine. After

(*Concluded on page* 188)

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The MASTER 24" Disc Grinder offers you a versatile, rugged, long-life machine for many efficient grinding operations in your plant. It is perfectly balanced, vibration-less, quickly and easily adjusted, will not stall under heavy loads on either metal, wood or plastics. Available in two models:

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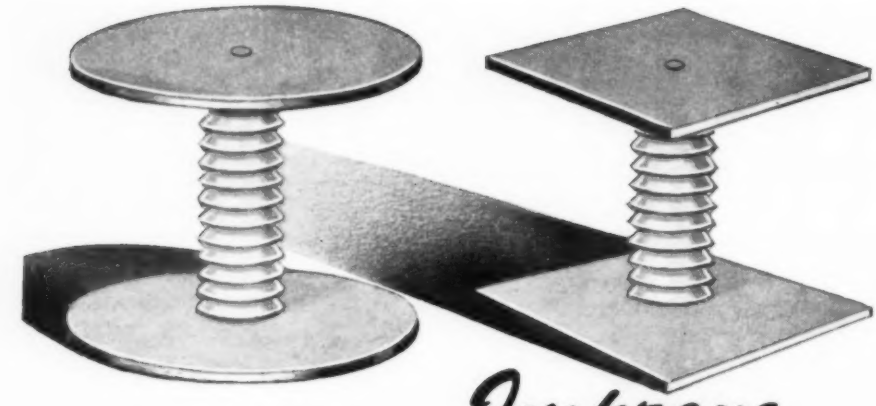

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(*Concluded from page* 186)

the furnace is moved into position the molten metal is emptied into a preheated pouring box, from the bottom of which a 5/8-in. diameter spout leads to a 3/4-in. opening in a refractory-lined plate which closes the end of the mold.

The gun mold, conical in shape to provide extra mass at the breech end where additional chilling is required in cooling the molten steel, weighs from 4 tons for the 40-mm mold to 20 tons for 90-mm mold. This mold fits into a steel casing, or rotor-rotated through belt drive directly from motor.

Considerable study has been given to rate of pour and mold rotation. If the metal is poured too rapidly there is a tendency for the thin frozen layers of previously introduced metal to break, while cold shuts may result if pouring is too slow. Pouring time and speed of rotation naturally vary with size of the gun; a 90-mm anti-aircraft or tank gun, 18 ft long and weighing about 5000 lb, requires approximately 5 minutes to pour, the mold is rotated at about 1200 rpm, and the casting solidifies in somewhat less than 25 minutes. Experiments have been conducted at Watertown with a water-cooled machine which offers possibilities of increasing production materially by cutting down the time required for the metal to freeze, and also of lengthening mold life.

Dampen Mold Vibration

Another investigation concerned the effect of vibration on microstructure of the casting. Tests in pouring an ingot on a vibrating machine showed that segregation rings were created for each number of vibrations, and to overcome this condition in casting guns, the rollers that revolve the molds in large machines are mounted on springs which tend to dampen the mold vibration.

After the gun casting has solidified it is pushed out of the mold by a hydraulically operated ram located at the rear of the machine. The casting then is placed in a bed of cinders to cool slowly for two days. This is followed by heat treating and cold working. Heat treating practice has been revised somewhat from former procedure as a result of experimental work, and has permitted a reduction in the normalizing and tempering cycle time. The overcoming of hydrogen embrittlement in the grain structure was accomplished by a six-hour soak at 570 F which tended to disseminate the embrittlement.

End of the war naturally cut off a large part of Watertown's production program. As in the past, however, the Arsenal will continue its research and experiments with materials and manufacturing processes, constantly seeking the improvements that can contribute so much to the nation's defenses.

Gar Wood Industries Inc., Detroit, has purchased 92 per cent of the capital stock of the Buckeye Traction Ditcher Co., Findlay, O.

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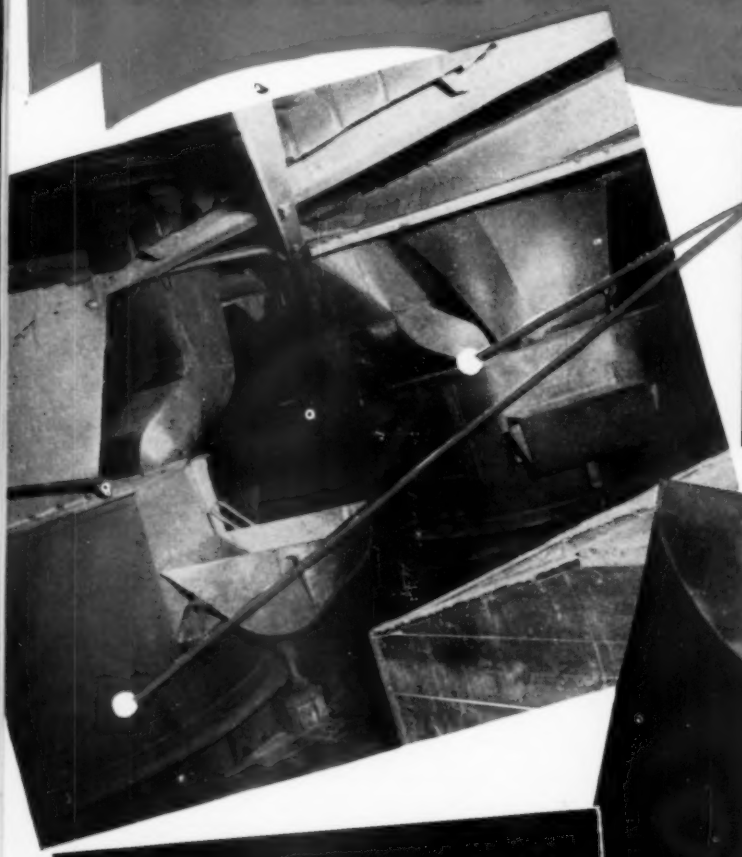

These two Model 70 Speedmullors (each with batch capacity of 15 cu. ft.) at Ohio Steel Foundry Company, Lima, Ohio, mull sand to rigid specifications in 1½ min. per batch. And this time cycle includes air cooling and fines removal! Compare this achievement with any other method!

Here's another Model 70 Speedmullor at Ohio Steel that produces actual test results as follows:

Mulling Time	Strength	Moisture	Perm.	Flow
30 sec.	6.5	3.0	210	71
45 sec.	6.9*	3.0	220	70
60 sec.	6.9	3.1	220	70
75 sec.	6.9	3.2	220	71
90 sec.	6.9	3.1	220	71

* Ultimate strength obtained in 45 seconds and remaining time is given to cooling sand.

Speedmullor

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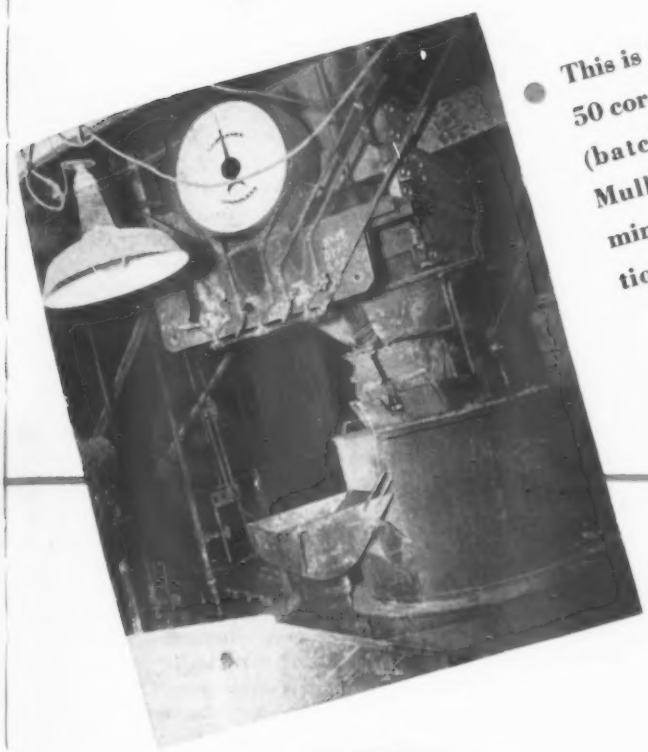
Speedmullor



● This is Ohio Steel's Model 50 coreroom Speedmullor (batch size 7½ cu. ft.). Mulling time is about 1 min. without oil—an additional 1¼ min. with oil.

● See the Speedmullor operate! We will make complete arrangements to have you see a Speedmullor in action in a foundry near to you. Write us today, and we will make an appointment for a visit at your convenience!

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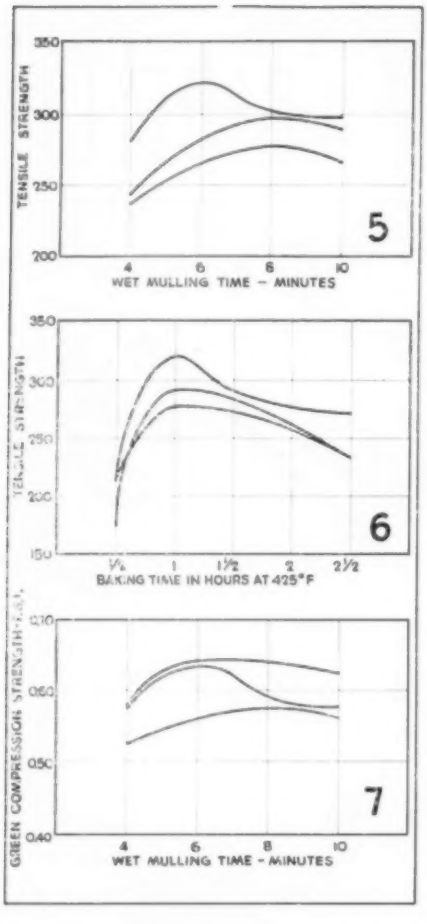

Fig. 5—Relation between mulling time and baked tensile strength of oil-cereal-clay-sand mixture of ratio 1.35:1.07:0.05:-100 with 2.5 per cent moisture. Sand mulled dry for 2 min before adding water, followed by oil

Fig. 6—Relation between baking time and baked tensile strength of same mixture as shown in Fig. 5. Mulled 6 min with 2.5 per cent moisture, baked at 425 F. Three different flours were used to illustrate typical corn flours tested in this work

Fig. 7—Relation between time of wet mulling and green compressive strength of same mixture. Mulled dry for 2 min before adding water, followed by oil. Three different corn flours used to illustrate three types of relations which exist, and are typical of ten corn flours tested

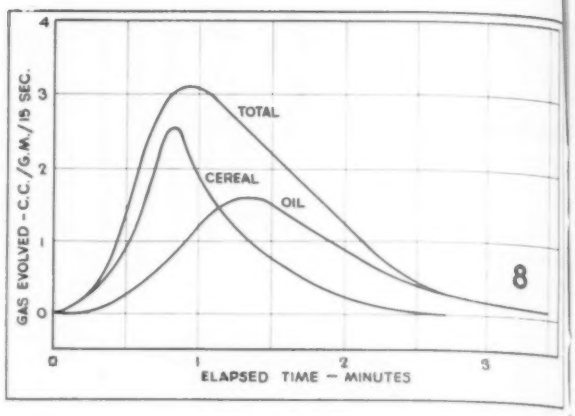

Fig. 8—Curve indicating rate of breakdown or rate of destruction of cereal and oil binders in oil-cereal-sand mixture of ratio 1.35:1.07:100 with 2.5 per cent moisture. Breakdown measured in rate of gas evolution in cubic centimeters per gram per 15 sec

EFFECTIVE USE OF CEREAL CORE BINDER

(*Continued from page* 109)

flour is to increase the green bond or green strength of core sands in direct relation to the amount used (up to nearly 3 per cent). A major reason for the widespread use of corn flour is because it provides one of the few efficient ways of obtaining sufficient green strength to permit production coremaking and handling prior to baking. The relationship between the amount of corn flour and the green strength is indicated in Fig. 1, which is discussed later in greater detail.

2. *Dry Strength*—One of the advantages of corn flour is its ability to increase the dry or air-dry strength of sand cores. This is illustrated in Fig. 4, using a commercial core-sand mix containing oil, cereal, and sand in the ratio of 1.35 to 1.07 to 100, respectively (1.35:1.07:100) mixed at 2.5 per cent moisture. The top curve of Fig. 4 is obtained by leaving out the oil in order to demonstrate the effect of the cereal alone. The middle curve shows the properties of the base standard mix, including both oil and cereal, while the bottom curve is for the same mix without the cereal binder. This illustrates the fact that the air-dry strength is due entirely to the cereal binder. This feature of cereal binders is of value in the core room to ensure that cores will not sag, break, or lose shape while waiting to go into the core oven. The correct application of air drying permits the coremaker to allow his green cores to stand on the racks for long periods of time prior to baking without danger of losing the sharp edges and other unsupported portions of the core; in fact, many coremakers prefer to let cores stand on the rack for 30 minutes to an hour to develop air-dry strength in cores which might otherwise break in handling or collapse during the early stages of the baking process. In cereal-bonded cores, air drying has no practical effect on subsequent baked strength.

3. *Baked Strength* — Although corn flours are not usually added to core mixes for the purpose of increasing the baked strength, they do contribute to that property. This is illustrated in Fig. 1.

4. *Permeability*—It sometimes is stated that corn flour decreases the permeability of core sands, but, peculiarly enough, these binders are actually used to permit higher permeability. The major reason for this apparent discrepancy is that corn flour is particularly effective with sharp sands. Therefore, the effective green bond of cereal binders, when used with sharp sand, aids in obtaining an open core and, therefore, a higher permeability than would be possible without this particular advantage. Actually, there is a second, but minor, effect on permeability, illustrated in Fig. 1, in that the permeability is increased slightly with low percentages of corn flour and, even at 2 per cent, the permeability is approximately equal to that with no corn flour. It is apparent that the overall effect of corn flour is to aid in the production of a more permeable and open core.

5. *Absorption of Other Binders* — Another property of corn flour binder, which influences the extent of its use, is that it does not absorb core oil from the mixture. This means that it does not interfere with or detract from the effectiveness of the core oil which is present in the mixture to obtain baked strength. This feature is in addition to the direct increase in baked strength due to the corn flour, so that the commercial combination of oil and cereal results in maximum baked properties.

6. *Rate of Drying*—During the past few years, the demand for foundry production has emphasized the importance of the quick-drying characteristics of cereal corn flour. Substantial reductions in baking time and the consequent increase in coreroom production are possible by utilizing this material to its greatest advantage. The exact amount by which the baking time may be reduced depends primarily upon the type and amount of oil and the type and amount of corn flour. However, these factors are determined readily in practice if it is realized that the possibility of such a reduction does exist.

7. *Burn-Out*—The ability of corn flour to burn out rapidly and completely during the casting process is one of its advantages most frequently referred to. The fact that this flour burns out quickly is, of course, responsible for quicker core collapse, with less tendency toward cracking and other defects related to collapsing time. The fact that the material burns out completely reflects easy shake-out and economical cleaning of castings. The rapid and complete burn-out of corn flour is illustrated in Fig. 8, which shows the rate of gas evolution from a cereal-oil-sand core during the first 3 minutes of heating at 1800 F. It is apparent that although both the cereal and the oil burn out with approximately the same amount of gas evolution, the rate of evo-

lution is entirely different. The cereal obviously burns very quickly and is converted to gas at an early stage and, under these particular circumstances, is completely destroyed in a matter of 2½ minutes. In casting, it is anticipated that this burn-out may be more rapid than in the laboratory test employed, but the data indicate the relative collapsing times under commercial conditions.

8. *Surface Hardness*—During the first stage of the baking process, the water-soluble portion of the corn flour tends to migrate toward the surface of the core. This tends to build up a concentration of binder near the surface of the core and to produce a core with a high surface hardness but with good collapsibility throughout the core and high permeability at the center. This tendency toward skin hardness may be increased or decreased by changing the ratio of oil to cereal in the mixture.

9. *Ease of Mixing*—Corn flour not only mixes readily with the sand to permit a uniform distribution of bond and sand, but also mixes with all of the other binders with ease and without detriment to the properties of any binder.

General Precautions—Among the first of the general precautions to be observed in the proper utilization of corn flour are the proper methods of storage to keep the flour in a usable condition and to avoid waste. Since corn flour is a starch type material, it is subject to attack by vermin. Therefore, it is obvious that if the material is stored in damp corners on concrete or sand floors, it may pick up bugs and even attract mice or rats. This is perhaps a minor point, but it is certainly one phase of good housekeeping which should not be ignored.

May Pick Up Moisture

Another similar precaution, but based on a more direct influence on the properties of corn flour, is the avoidance of the tendency toward the pickup of moisture. Although not a major problem, corn flour that has picked up moisture tends to ball up and retard proper mixing of the core sands. Therefore, storage facilities should keep the flour dry and clean to ensure maximum speed of mixing and avoid unnecessary loss. The technique is simple. Store the bags of flour on wooden skids which permit an air space beneath and around them. Corn flour must be stored inside away from exposure to rain, snow, or other forms of water.

Standard Measurement — Weight vs. Volume — One of the easiest ways to waste corn flour is to use incorrect measurement. Unfortunately, the tendency to do so is rather widespread in the foundry industry. Corn flour should not be measured by volume! In the first place, the moisture content of the corn flour may vary during storage. This variable factor will change the apparent volume for a given weight, sometimes to a marked degree. Secondly, corn flour packs down easily in a container. This fact is particularly noticeable when the coremaker has a tendency to rap the flour container as

(*Continued on page* 195)

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(*Continued from page* 193)

he measures it to pack the material into the measuring can. It is almost impossible to obtain uniform conditions with this practice because such rapping is not a constant, uniform procedure.

In addition to these handling factors, there is also the third consideration of initial weight per volume, since the various flours on the market may vary in weight from one producer to another. The better flour producers maintain uniform weights of flour and ship within close limits of a fixed weight. However, different flours made by different manufacturers may be quite dissimilar in their weight per volume, so that a volume measurement has but little significance. Sometimes this factor is not taken into consideration in interpreting comparative results with different flours. It is very possible that flours that show quite different weight-to-volume relationships may yield similar or identical results when compared on the basis of weight. Since flour is sold by the pound, volume consideration is not important. The authors would strongly suggest that any foundryman interested in utilizing these materials with the greatest economy should dispense with volume measurements and utilize the same accuracy and care in measuring corn flour as he does in measuring sand, core oil, and other binders. This is not only an economic consideration, since, if there is a variation in the amount of corn flour used, there will be a variation in the properties of the final core.

Reduce Dry Mixing Time

It is common coreroom practice to mix the dry ingredients in a muller for a short period of time before adding either oil or water. Dry mixing should not be excessive when corn flours are used, since they may develop considerable green bond or stickiness during the mulling process and slow down the mixing of the other materials. Under normal conditions of more or less initial moisture in the sand, it is advisable, when using more than one dry binder, to add the corn flour first and follow with the other materials. Incidentally, in the experimental work done at Battelle Memorial Institute on the properties of corn flours, the sequence of mixing was sand, cereal, clay, water, and then oil. It is true that there is some disagreement as to whether the oil should precede the water or vice versa, but in the initial experiments it was impossible to determine any difference between the two practices, and so the water-preceding-the-oil routine was used as being the more popular in practice.

Specific Precautions—Major considerations in determining the effect of any material as a binder for core mixes are: (1) the amount used, (2) the moisture content, (3) the mulling time, and (4) the time and temperature of baking. These factors apply equally to the use of corn flour binders, and their importance is just as great for these binders as for core oil or any other material. When the proper consideration is given to each of

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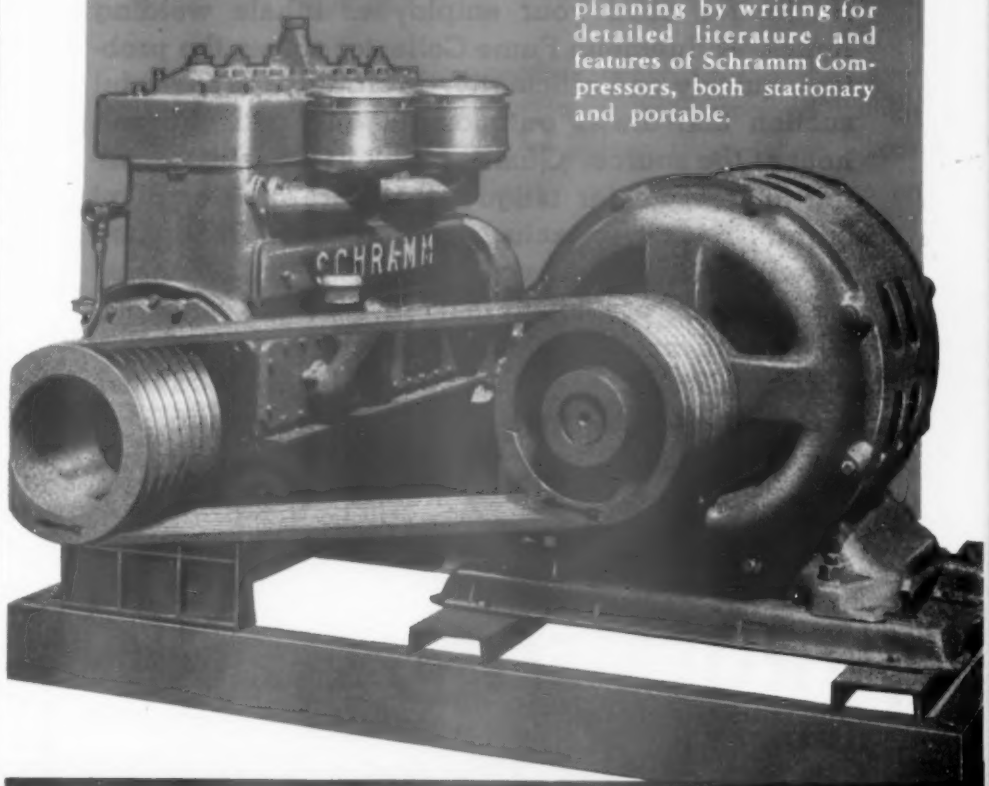

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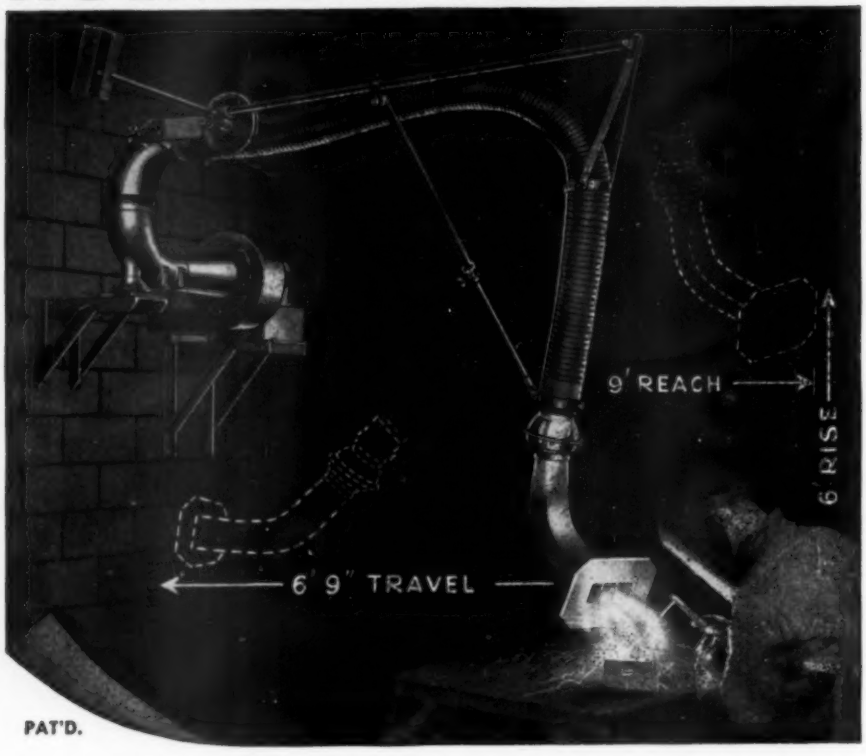

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these four major factors, it is possible to obtain the most from corn flour core binders. This is important not alone from the standpoint of economy but principally in order to obtain the optimum combinations of physical properties in the core. Within reasonable limits, the factors of moisture, mulling time, baking time and temperature, and amount of addition—all have an influence, one on the other, to determine the best obtainable combination of physical properties.

In considering either moisture, mulling time, baking time and temperature, or amount of core binder, there normally is a fairly narrow range of optimum properties. Core binders, in common with most materials used in the foundry, do not obey the rule that if a little bit is good, more is better. There is an optimum range for each factor and maximum properties are obtained only within that range. In practice, it is not always possible to work to the optimum value for each factor, but, with sufficient information, it is possible to arrive at a reasonable compromise based upon fact rather than an erroneous conclusion based upon assumptions or superstitions.

For example, knowing which moisture content gives the maximum properties with flour and which is most effective for core oil (and assuming that these two moisture contents are not the same), it is possible to compromise on an intermediate value which best serves the interest of the coreroom. In this regard, the moisture content should be sufficiently higher than the theoretical optimum to compensate for any drying out prior to coremaking. If this is not done, the actual moisture content of the sand, as worked, may be reduced to within a range of low properties. Similarly, intelligent utilization of information on mulling time, baking time, and baking temperature permits optimum results.

Flour Increases Strength

The effect of varying amounts of corn flour on the properties of an oil-sand mix (1.35:100) is illustrated in Fig. 1, which shows the relationship between the various core properties and amount of cereal flour (read in parts of flour per 100 parts of sand). Up to the limit indicated, an increase in the amount of flour directly reflects an increase in green compressive strength. The maximum value for green compression is outside the limits indicated, probably between 2 to 3 parts per 100. As far as compressive strength alone is concerned, the amount of flour used would depend upon the application and the need for higher or lower values.

The curve shown for flowability, as measured with the Dietert flowability indicator, indicates no major change within the limits of 2 parts per 100. In this range, the cereal apparently neither increases nor decreases the ability of the sand to flow into the core box and make sound cores.

Green permeability is reduced slightly by increased amounts of corn flour, but normally this fact does not influence the

(*Continued on page* 200)

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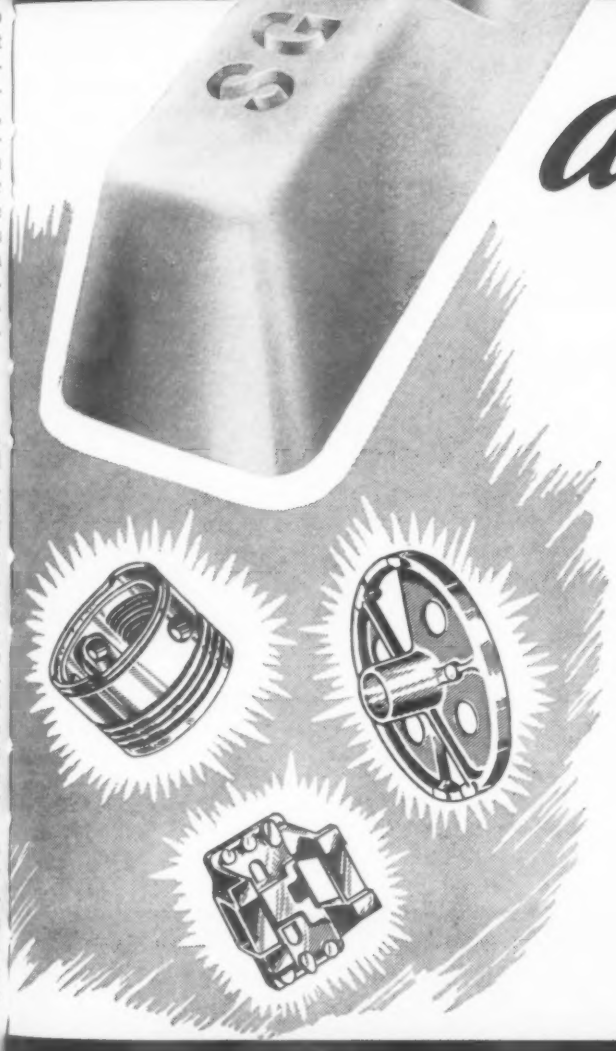
FROM *Aluminum* ALLOYS BORN IN THE LABORATORY



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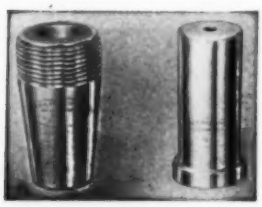

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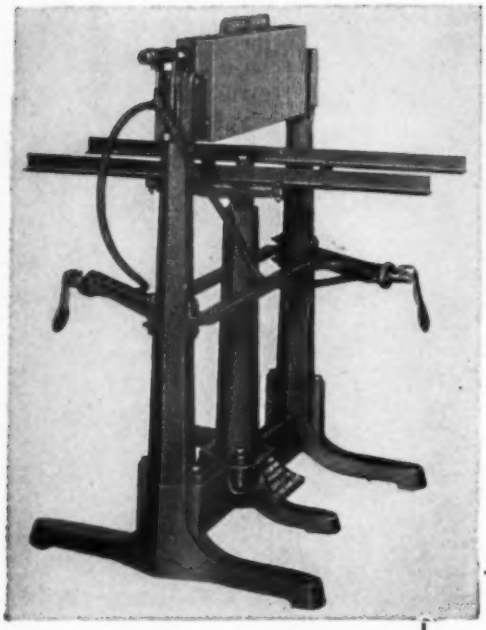

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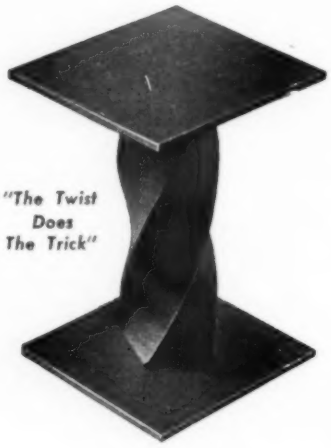

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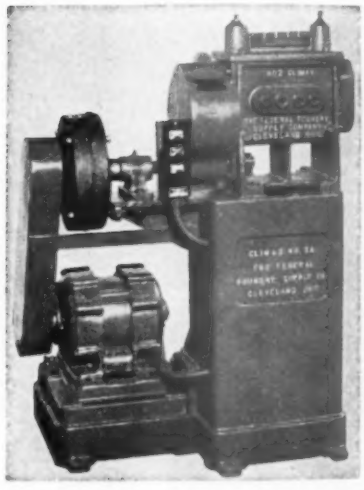

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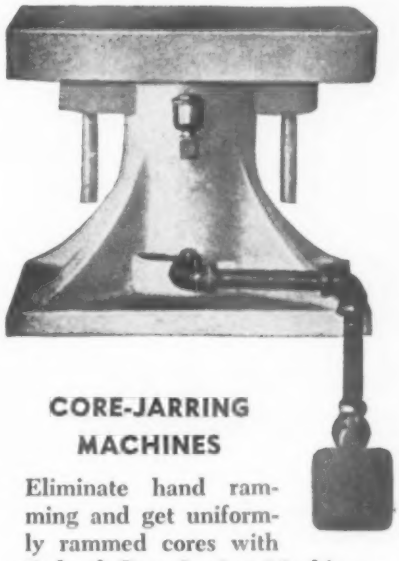

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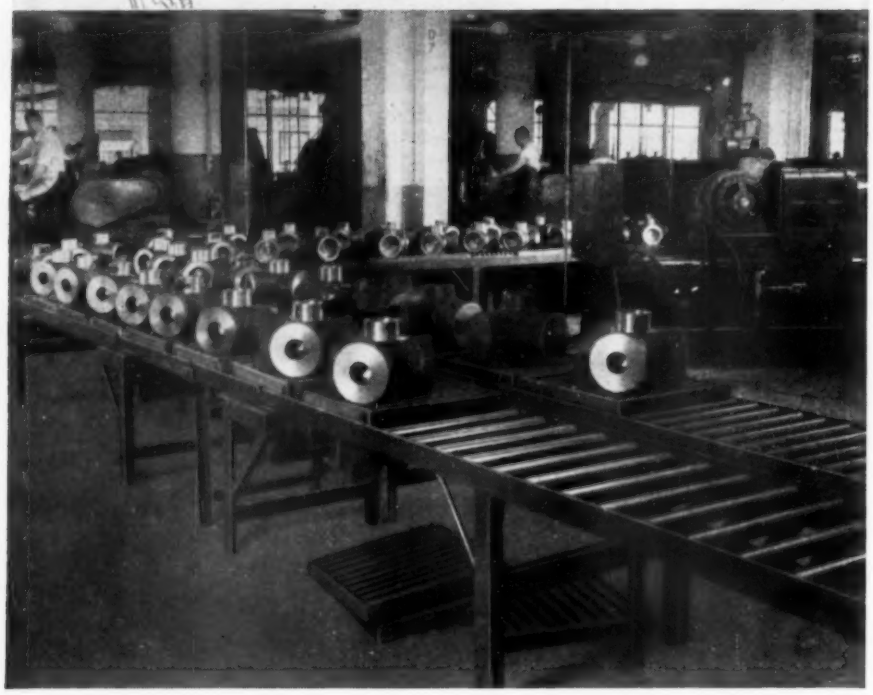

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(*Continued from page* 196)

decision as to the correct amount of binder to use, since green permeability is not a determining factor in normal core practice.

As stated before, the baked permeability is greatest with approximately ¼ part of cereal to 100 parts of sand, and is subsequently reduced slightly with increasing quantities of binder. Therefore, between 1 and 2 parts of flour per hundred gives approximately the same permeability as the original mixture without any cereal. If an increase in permeability is necessary, it can be accomplished by using more sharp sand in the mixture and using corn flour to obtain sufficient strength, without reducing the permeability attributable to the more open base sand.

Baked tensile strength measured at 220 F is an arbitrary test to indicate the hot strength of the core. Fig. 1 indicates that there is a gradual but definite trend upward with increasing amounts of corn flour. The maximum is obtained at approximately 1.5 parts per hundred, but the curve is very flat in that range, indicating that the strength is relatively unaffected by minor variations from the optimum amount of flour.

The baked tensile strength (measured at room temperature) curve indicates a marked improvement on increasing the flour up to 1.5 parts per hundred, again only slightly affected by minor variations from the optimum. This is an important consideration, since it is undesirable to have a very narrow range of maximum properties.

Center Is Softer

As might be anticipated, the relation between the hardness of cores and the amount of cereal used is that of a straight line. The values obtained, however, indicate a surface-hardness condition, and do not necessarily infer an equal increase in hardness at the center of the core. The center tends to remain somewhat softer and more permeable than is indicated by the data of Fig. 1.

It should be apparent after examination of Fig. 1 that definite conclusions based upon physical properties may be drawn as to the optimum proportion of corn flour required for any particular mix. The first step is to determine the desired green compressive strength, taking into consideration the fact that the best core practice calls for as low a green compressive strength as possible without losing dimensional accuracy of the core. On the basis of the desired green compressive strength, it is possible to determine the correct amount of corn flour to be added, and then take the increase in hardness and baked tensile strength into consideration by changes in the remainder of the core mix. It is not necessary to allow for any change in permeability or flowability, since the rate of change of these two properties is negligible.

It should be emphasized that the data in Fig. 1 apply only to the particular core mix used, and do not indicate that the identical figures would be obtained for

(*Continued on page* 202)

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(*Continued from page* 200)

another core mix utilizing other binders in various proportions or that better properties may not be obtained by other mixes. However, the general trend is true for most mixes and is very accurate for mixes of the type involved, namely, oil-bank sand mixtures using a linseed-base oil to sand ratio of 1.35:100.

Effect of Moisture—Variations in moisture content are known to influence the properties of core sand, but the unusual importance of this relationship has not been adequately emphasized. The difference between the water-green strength relationship (in the range of moisture normally used for blown or machine-made cores) of an oil-cereal-clay-sand mixture (1.16:1.16:0.30:100) and a testing-sand mix in a cereal-oil-sand ratio of 1:1:100 is illustrated in Fig. 2, the upper curve being for the more complex core sand mixture. It is apparent from these curves that the stronger, more complex mixture is much more sensitive to variations in moisture than is the simple cereal-oil-sand mix of the lower curve.

This is not an indication that the simple mix is necessarily superior to the complex mix, since it is evident that the two mixes have entirely different properties which enable each to meet different requirements. However, these data should emphasize the extreme danger of careless moisture additions, since it is obvious that even a very small variation in moisture content in the range below 2 per cent will drastically reduce the green compressive strength of the mixture. With more than 2 per cent water present, the effect becomes less marked, indicating a greater working safety. Therefore, recommended moisture contents vary from 2 to 3 per cent depending upon the anticipated prework drying.

Judge Merits of Two Sands

The comparative sensitivity to variations in moisture may determine the relative value of two core sand mixtures otherwise capable of fulfilling the requirements of a particular shop. Furthermore, it is reasonable to expect that the comparative merits of two different sand mixes should be judged only after determining the optimum moisture content for each one. For example, if one mix develops maximum properties with 3 per cent moisture and another shows its maximum at 2 per cent moisture, a comparison of them at either of the two optimum moisture contents would be unfair.

A discussion of the effect of moisture on the properties of cores would be incomplete unless it emphasized that one of the major reasons for variations in moisture is the variable water content of core sand brought into the plant. Core sands which vary widely in their initial moisture make trouble in the foundry unless they are accurately analyzed and carefully regulated to a standard moisture content. The obvious method of avoiding such difficulty is to use dry sand (dried either by the producer or the foundry) so that a fixed amount of water may

(*Continued on page* 204)

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(*Continued from page* 202)

be added with a reasonable guarantee that the final moisture content will be correct. Many of the variations observed in coreroom practice may be directly traced to the variations in the initial moisture content of the sand. Most of the core mixes in commercial use are sensitive to moisture variations and even minor changes in the final water content may scrap cores or castings.

Fig. 3 is used to demonstrate that the initial moisture content of the mix influences not only the green properties but also the tensile strength and other baked properties. It is apparent that in this particular mix (relatively low baked strength, weakly bonded, oil-cereal-sand), the maximum tensile strength is obtained with between 2 and 3 per cent of water. The same range of moisture also permits hardness and permeability properties.

Regulate Moisture Content

It should be emphasized that the moisture contents shown in Fig. 3 refer to the moisture at the time of making the cores (which were tested immediately). A core made with 3 per cent water, for example, and then dried to 1 per cent water would show high compressive strength due to the air-drying process (See Fig. 4). If, on the other hand, a core sand mixture containing 3 per cent moisture were allowed to lose its moisture on the bench before being rammed into cores, it would lose its strength following the relationship similar to that indicated in Figs. 2 and 3. Therefore, it is essential that the control in the coreroom be based on a predetermined, closely regulated moisture content and, further, that arrangements be made to maintain sufficient moisture in the sand up to the time of actually using the sand and ramming the cores. Any tendency for these sands to stand for long periods on the bench and dry out in a loose condition may bring the moisture content of at least a portion of the sand to below the critical moisture range and result in scrapped cores and castings. For example, core mixes which are used for machine and bench coremaking usually are prepared at a higher moisture level for the hand work than for the machine in order to compensate for the slower handling.

Effect of Mulling Time—It is well known that core sand requires intensive mixing to develop sufficient green bond to make good cores. However, quantitative information on the effect of varying mulling times is not completely recognized. This research program on cereal binders has indicated that the effect of mulling time depends upon the characteristics of the flour to an appreciable extent. This is illustrated in Fig. 7, which includes the optimum mulling time for three different corn flours that show three typical types of curves for mulling times versus green strength.

It is apparent that under the conditions of these tests, core sands are very sensitive to slight changes in mulling time up to at least 6 minutes. In other

(*Continued on page* 206)

Electro HIGH-SPEED CUT-OFF WHEELS

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Operators get a great kick out of using these new, ultra-thin, amazingly strong Electro CUT-OFF WHEELS.

They sock the loads to 'em with absolute confidence in their own safety because they know that, with resin-bonding, we finally solved the problem of achieving tremendous strength in wafer-thin wheels.

Instead of the boredom of nursing and waiting for the cutter to worry its way through the cut, they get a thrill out of watching these new Electro Cut-Off Wheels wade right through hard or soft, thick or thin metals or ceramics (under wet or dry conditions) in seconds instead of minutes.

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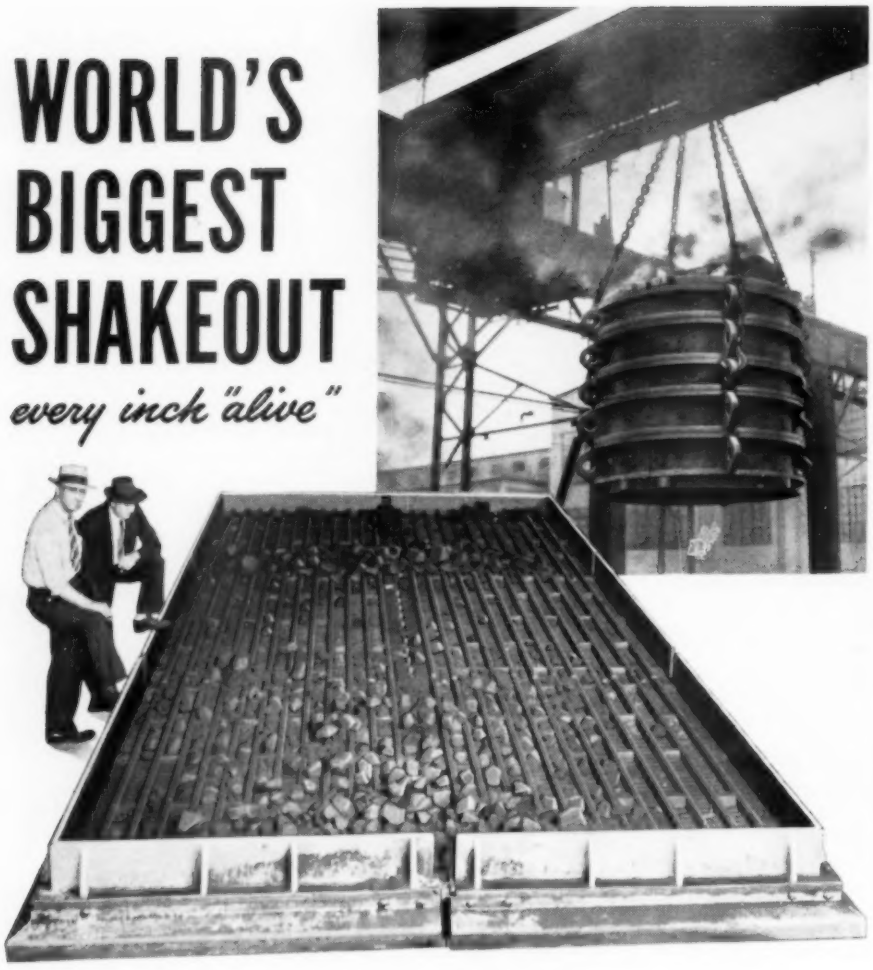

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Robins Floatex Shakeouts are made in Portable models for loaded flasks weighing up to 17 tons; in Standard models, up to 100 tons or more—non-discharging and self-discharging types; with and without flask loaders.

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(*Continued from page* 204)

words, during the first 6 minutes, the green strength changes very rapidly with a change in mulling time, so that even minor variations may seriously impair the green compressive properties. It is no wonder that many commercial core sand mixing operations show "unexplainable" variations in physical properties in spite of the fact that sand, oil, cereal, and other components are very accurately measured and apparently accurately controlled. Such variations increase with an increased production rate, which tends to decrease the time allowed for mulling.

One of the interesting observations to be made from Fig. 7 pertains to the characteristic curves of the three cereal flours. The upper line represents the relationship between mulling time and green bond for flour which reaches maximum compressive strength with shorter times of mulliing. This flour can be mulled completely in as little as 6 minutes, under these particular conditions, and from then on will not be detrimentally affected by longer mulling times or unavoidable variations.

The middle curve is for the type of corn flour that attains maximum green compressive strength in the same short period of time, but is detrimentally affected by further mulling. With this type of flour, unavoidable variations or extensions of mulling time prove detrimental and reduce the green strength.

Requires Long Mixing Time

The lower curve, of course, indicates a lower compressive strength per unit weight of flour but, more important, it also indicates that at least 8 minutes of mulling time are required to obtain maximum properties with this type of corn flour even under identical mulling conditions. Therefore, the maximum results can be obtained only with long mixing times and subsequent reduced production. These factors should be considered not only in comparing competing materials but in using the cereal binders in commercial applications. Since normal practice is to utilize the lowest possible green bond consistent with easy handling, the danger of variations in mulling is intensified. Very few foundries can use core mixes with sufficient excess green bond to permit substantial variations due to mixing time discrepancies.

Fig. 5 is plotted from data obtained using the same core mix as described for Fig. 7. The mulling time apparently has a similar influence on the tensile strength of baked core. Again, the corn flour having the characteristics indicated by the upper curve produces maximum strength (tensile in this case) within the first 6 minutes of mulling time. It is apparent that maximum properties can be obtained for this particular flour by the simple expedient of working close to 6 minutes of mulling time, at least for conditions in the tests reported.

The middle and lower curves are very similar to each other in that they both

(*Continued on page* 208)

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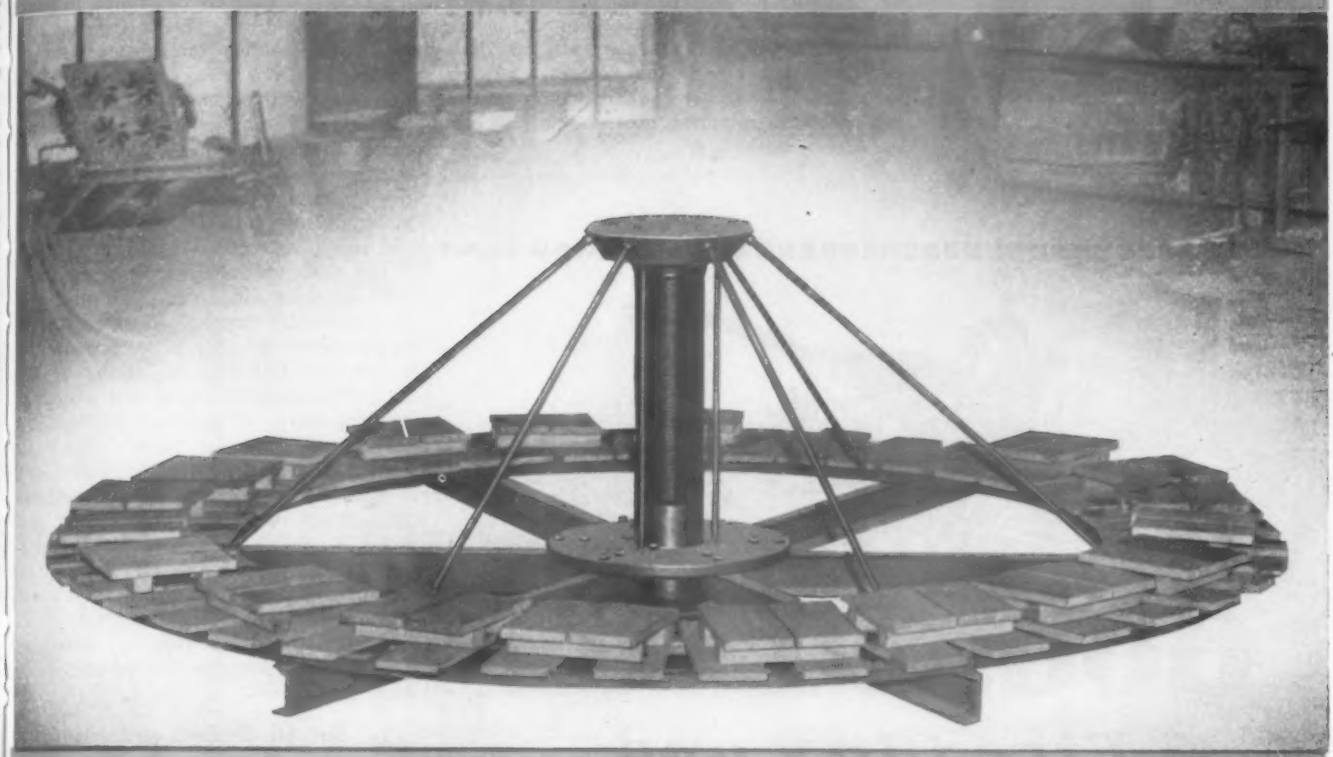

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3 Sizes

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Full roller-bearing construction for easy turning. When desired, release of ratchet makes free-wheeling. Can be rotated with one finger even when fully loaded. No motors or other operating cost.

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Easy to assemble and install, the unit sets on the floor without the necessity of anchoring, thus giving full flexibility. It is placed just back of each molder who simply turns around, places his mold on the conveyor, then steps on a trip ratchet release . . . spring arrangement revolving ROTO-CAST to position for receiving the next mold.

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COLDWATER, MICHIGAN

Brings MECHANIZATION to the Molding Floor at LOW COST

(*Continued from page* 206)
show a maximum value with 8 to 9 minutes of mulling time.

The information in Figs. 5 and 7 was obtained with a commercial core mixture of oil, cereal, clay, and sand with a ratio of 1.35:1.07:0.05:100 with 2.5 per cent moisture. Mulling tests were conducted under controlled conditions of time, temperature, and humidity. All cores were baked in a recirculating type oven under standard ideal conditions and tested at constant-temperature conditions.

Baking Time and Temperature — The temperature and time of baking are the most obvious considerations in the control of the properties of cores and are, fortunately, the ones which receive the greatest attention. It has been the intention of the authors, however, to demonstrate that other variables are entitled to almost equal consideration in actual practice.

The effect of baking temperature on the properties due to corn flour may be summarized quite readily without diagrams. It is common practice in the foundry industry to vary the baking temperature to suit the requirements of the size of the core, and research data indicate that this is the correct approach. Basically, lower baking temperatures, although requiring greater time for baking, are much less sensitive to variations in baking time. It follows that a large core or core with heavy and light sections is more properly baked at a low temperature and for long periods of time to avoid burning of one portion and underbaking of the other. Smaller cores, on the other hand, and cores that have uniform light sections, may be baked at higher temperatures to utilize the shorter baking time, provided the baking time is accurately controlled to avoid loss in properties. This is true because the higher baking temperatures are accompanied by a narrower range of baking times with optimum properties. The higher the baking temperature used the narrower this range is, so that with baking temperatures on the order of 500 F, the optimum range is extremely narrow and only one very definite time of baking will give correct results.

Fig. 6 shows the effect of three different corn flours employed in an oil-cereal-clay-sand mix (ratio 1.35:1.07:0.05:100) tempered to 2.5 per cent moisture for 6 minutes, followed by baking at 425 F. This temperature is not excessive, and the range of optimum properties is sufficiently wide for fairly large cores and a wide range of section sizes.

The uppermost curve is based on tests made with corn flour which produces a definite maximum at approximately 1 hour baking time, with a safe range of 15 minutes either way. This mixture is relatively unaffected by slight overbaking and, in fact, is reasonably safe up to 2½ times the recommended baking time.

Strength Depends on Binder

The middle and lower curves of Fig. 6 are similar in shape to the top curve, but do not reach the same high values for tensile strength. Furthermore, these two flours are more adversely affected by overbaking. If these same three flours were compared at higher baking temperatures, the curves would be similar and would differ principally in the numerical location of the optimum value. The maximum strength obtained, however, would be approximately equal to that obtained by any other correct combination of baking time and temperature and would depend only on the quality of the binder. Therefore, the correct method for determining the optimum baking time and temperature is based on the size of the core and the amount of latitude required. Large cores require greater latitude in order to prevent burning at the surface and underbaking at the center, whereas small cores can be baked at the higher temperatures and with better production rates.

Summary — It may appear that the interaction between the many factors, all of which affect the use of corn flour, and therefore determine its effectiveness or utility (as a core binder), are entirely too complicated. However, it should not be concluded that corn flours are difficult to use. Years of practical experience in foundries and the extensive

(*Concluded on page* 210)

GOOSE LAKE

Fire Clay and
Fire Clay Flour
Fire Clay Brick
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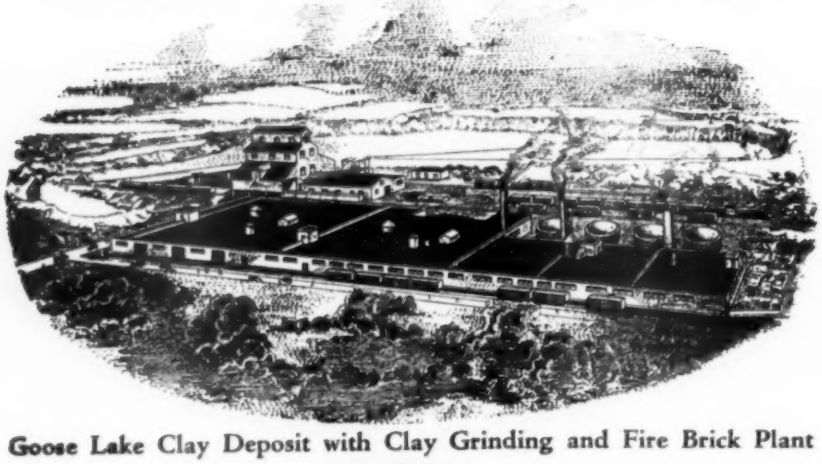

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SPO No. 100 Air-operated Jolt Squeeze Machines, pictured here, make both cope and drag molds with speed and accuracy, being designed for work involving matchplates and gated patterns. They are easy to operate, built for quick action, ideal for unskilled labor; with very few moving parts, shielded from sand and grit; easily lubricated. Cantilever or post type heads; stationary or portable models; range of sizes.

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MEMBER

(*Concluded from page* 208)

consumption of these materials over a prolonged period of time have demonstrated the relative simplicity of their use. As a matter of fact, correct use of these binders tends to simplify rather than complicate their application.

One of the complicated phases of coremaking is the apparent variation (the so-called "unexplainable" variation) in core properties which causes coreroom scrap. The coremaker may carefully measure his sand, oil, and corn flour. He may apparently mull the mixture under close control, and still one batch of core sand comes out better than another. One mix may show poor properties in the foundry, another one is difficult to work with at the core bench, and these variations, from day to day, and even from hour to hour, constitute one of the major headaches of the coremaker. It is the authors' expressed desire to furnish information on at least one of these core binders, namely, corn flour, so as to help the coremaker avoid complications due to improper use of the material. Careful control of amount of binder, percentage of moisture, correct mulling time, and optimum combinations of baking time and temperature will ensure the coremaker the use of corn flour to its greatest possible advantage, and eliminate at least one source of those unexplainable and nerve-racking variations.

The application of all core-binding materials follows certain fundamental laws. The difference between success and failure of a material is in the proper handling. Add to this the fact that economical operation can be attained only by utilizing each material to its greatest advantage, and the argument in favor of "control" is cinched.

WARTIME FOUNDRIES OF CHINA

(*Continued from page* 83)

meant that the cost of every item in the production of castings was constantly being changed, and no foundryman could quote a price for future delivery of his product. When the price of a simple lunch rises in a few months from $200 CN to $1960 CN, it is not difficult to imagine what happened to the price of pig iron.

Every foundryman in Free China wanted to make castings, but some had no raw materials and many had no orders. An overall co-ordinator was needed, and in the fall of 1944, Donald Nelson arrived, conferred with the generalissimo, and the War Production Board of China was set up under the able leadership of Dr. Wong-Wen-hao, who was also Minister of Economic Affairs, and director of the National Resources Commission. Mr. Nelson, Howard Coonley and a staff of expert iron and steel men from the United States acted as advisors.

Almost immediately, orders were placed with the foundries, raw materials obtained, finances arranged, and all the foundries started war production to supplement the output of the arsenal foundries, which were running over their capacity.

Small blast furnaces, making about 20 tons of excellent pig iron per day, were the main source of this important material but, as usual, transportation was the real bottleneck. In some cases, ore had to be transported in small loads on pony-back. Sometimes it was possible to use river boats or trucks—as long as they would run.

A very valuable source of pig iron was the "native iron" which was often made by farmers in off seasons. They operated on pockets of ore, reducing it in small homemade furnaces, turning out about 3 to 5 tons of iron per day. The metal was cast into thin slabs, the fracture of which was generally white. A typical analysis of the "native iron" was: C 3.80 per cent, Si 0.50 per cent, S 0.010 per cent, P 0.10 per cent, Mn 0.60 per cent.

Scrap of any kind was almost unob-

(*Continued on page* 214)

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Truscor and Amerikor mix QUICKLY with all other types of binders. Schedules can be stepped up.

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Truscor and Amerikor Cereal Binders give greater green strength especially with the sharp sand used to produce open cores. Save core oil.

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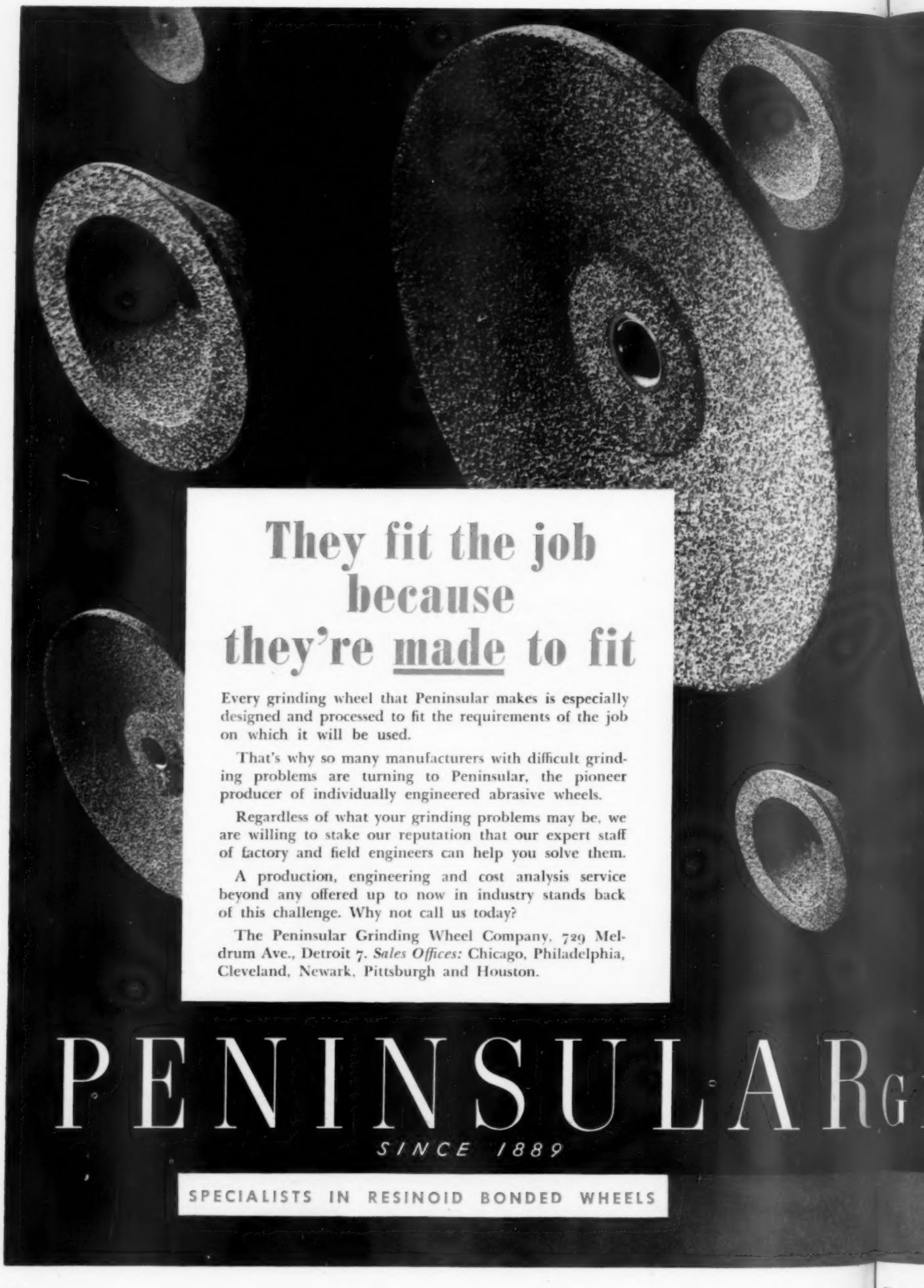

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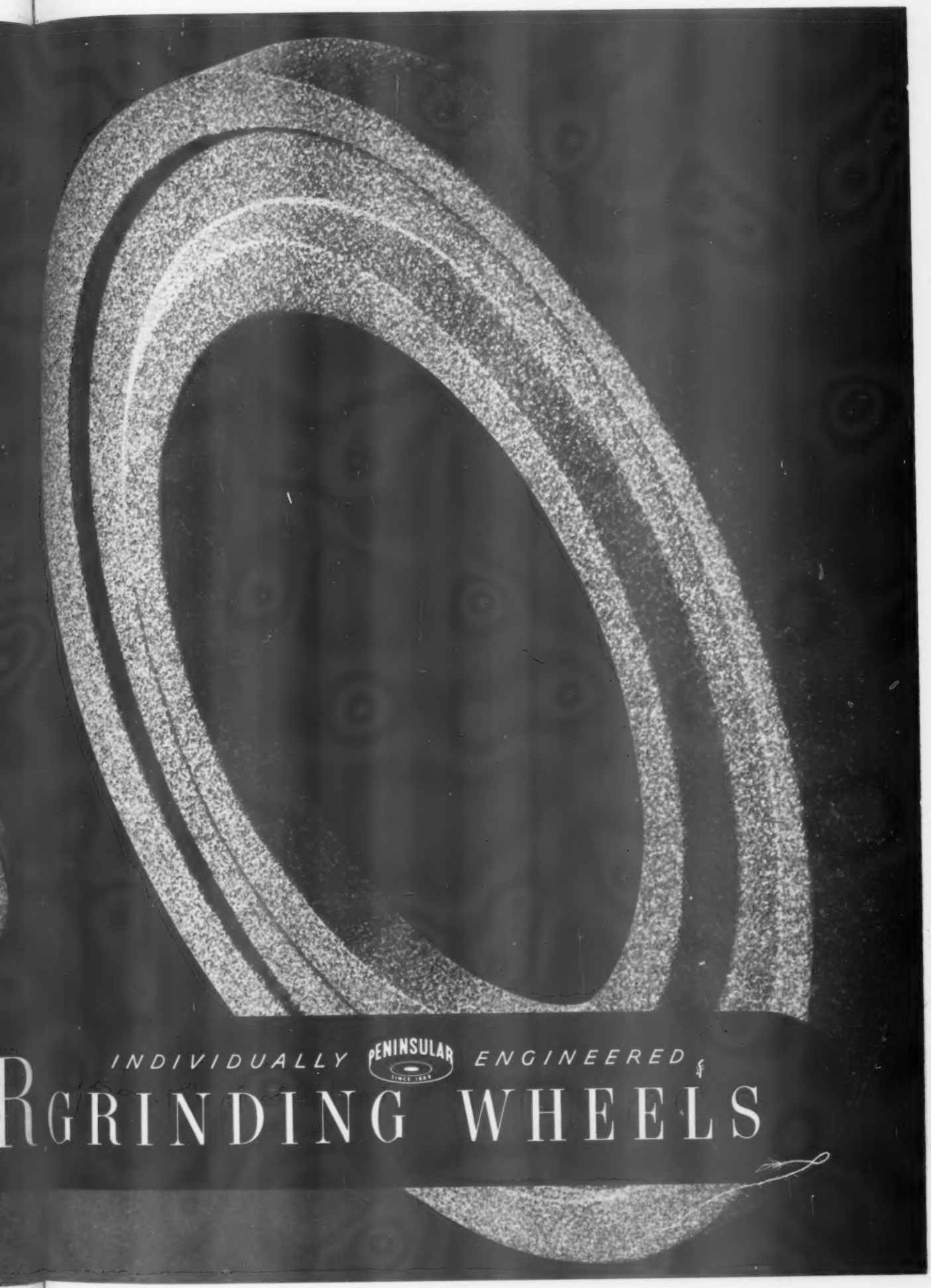
INDIVIDUALLY PENINSULAR ENGINEERED
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(*Continued from page* 210)

tainable. Coke ranged from excellent analysis up to 35 per cent ash and 6 per cent S. Extreme accuracy is the rule. In one foundry the iron was a little cold, and the author suggested adding a couple of extra shovelfuls of coke on each charge; his face was slightly red when the supervisor of the cupola explained that the extra coke must be weighed and an appropriate amount of extra lime rock added! Of course, he was correct, but how many foundries in this country are as careful?

Molding sand was one of the most difficult problems. Most of the sands contained ingredients of very low melting point, resulting in fused-on sand which gave great difficulty in machining, or in small holes in the surface which caused rejection of the castings. As the Japanese were advancing, land mines were badly needed by the Chinese armies. The sand fused on the mines so badly that machining was very difficult. The addition of ground coal and some changes in the sand improved production. For steel casting sand, quartzite rocks were crushed, mostly by hand. Labor costs were very high. It was found that the residue from the clay used in the manufacture of porcelain ware was almost pure silica and made a very satisfactory sand for steel castings. Good clay could be found in many places. Most of the larger plants made their own refractories, and the Chinese are as adept at making bricks as porcelain. Such materials were often ground in a circular mill, a heavy stone wheel doing the grinding with a patient water-buffalo for motive power. A boy or girl would shovel in the raw materials and start or stop the motive power by a few words or the light touch of a twig.

Based on U. S. practice, many of the foundries were overstaffed. Many young college graduates held supervisory positions and, in some cases, there was a decided lack of practical experience. This situation, of course, is in line with customs built up in China over centuries. Education has been a prerequisite for supervisory or managerial positions but, in the author's opinion, should be modified in order to offer incentive for the intelligent and industrious foundry worker who has not had the advantage of a college education.

Employ Every Type Furnace

Every type of melting equipment that could be moved was in use in Free China. Two high frequency electric furnaces were in constant use, making alloy steel. Several small open hearths were running to capacity. Various types of electric are furnaces were being used whenever power was available. Power, or rather lack of power, was another big bottleneck. The electrics could operate only a few hours, although the steel was badly needed. A rotary furnace, similar to the Brackelsberg type, was being operated very effectively when crude oil, or tung oil, or anything else that would burn was available, which was not often.

In connection with cupolas, converters were in general use, ranging from 500-lb to 2000-lb capacity, and excellent steel was made, although phosphorus sometimes as high as 0.30 per cent in the pig iron was a handicap.

But the melting equipment that really talks Chinese is the cupola. If steel plates are available, so much the better, but nothing will deter the Chinese foundryman who wants to melt iron. Give him silica rock, or bricks, and mud, and he will soon have a cupola in operation. Most of his cupolas are made in sections, each lined separately, and lifted into place. The smallest ones can be charged by a man standing on the floor next to the cupola. A ladder is used in charging the medium sized furnaces, which usually have three sections. The large sizes are welded or riveted, and follow our modern designs. Where a ladder is used, one man stands on top and another man hands up baskets of coke, iron, lime-rock, etc.

Where time and materials permit, the Chinese engineer will make first-class melting equipment. In one of the arsenals, a new cupola was needed for urgent war production. It was designed and built by the Arsenal staff, as shown in Fig. 5. Note the solid foundation, cast iron columns, riveted and welded construction, and that one section can

(*Continued on page* 217)

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6

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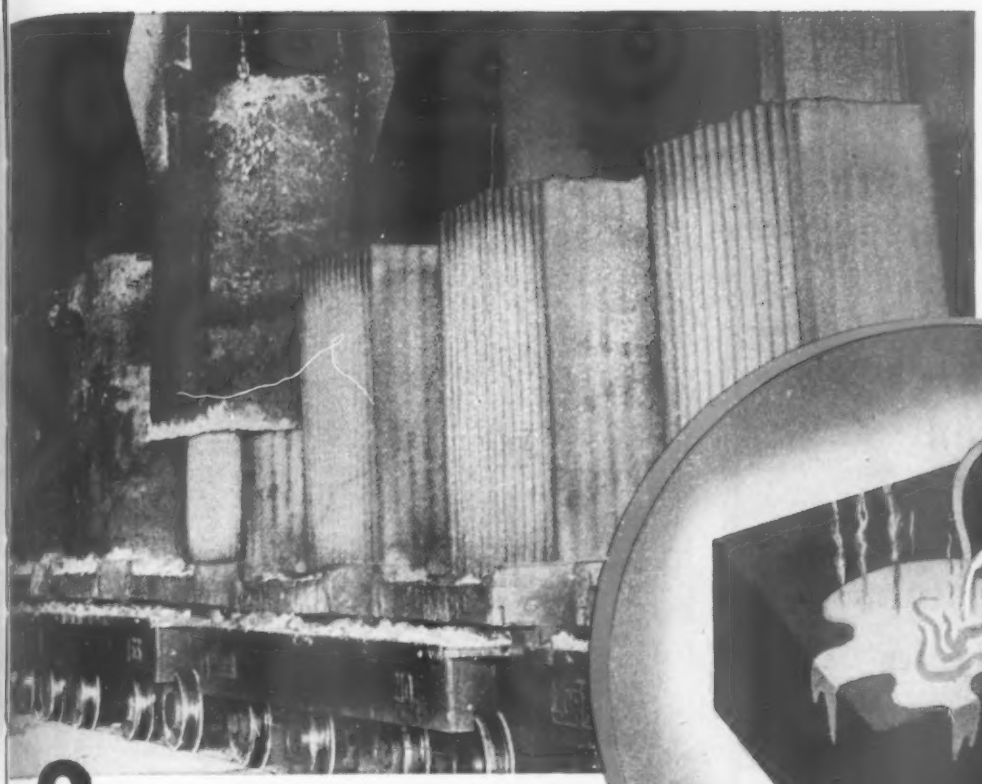

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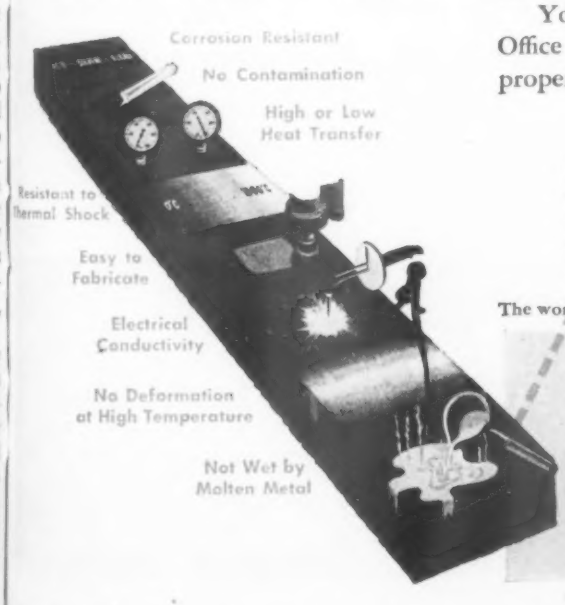

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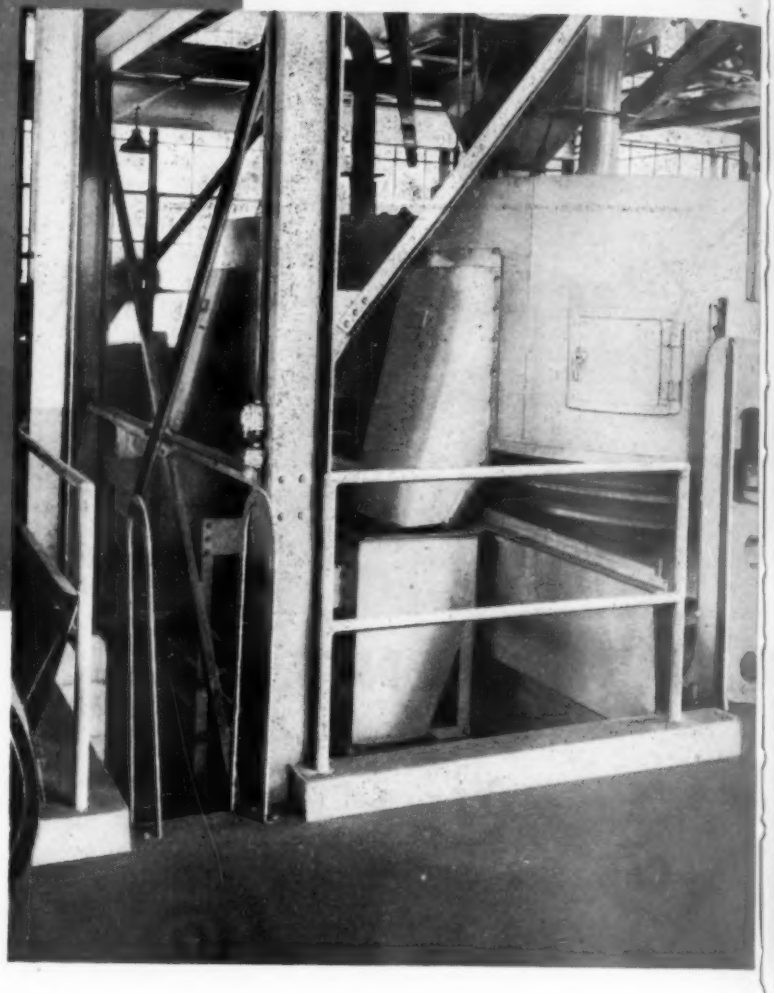

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(*Continued from page* 214)

be lifted from the other. The officer on the left is General Fan, director of the Arsenal. On the right is the superintendent of the foundry in which the cupola will be used. Several foundries usually were spaced some distance apart, to minimize danger of bombing.

Furnace operation is extraordinarily accurate. Every bit of iron, coke, limerock, sprue, etc., is weighed. Coke in the bed is measured or weighed, and molten iron is carefully conserved. In one of the large Arsenals, a forehearth is used to hold iron while it is being desulphurized. The spout is arranged for side slagging, and when a bull ladle is full, the operator forces down a plunger, which makes the iron back up, until another ladle is in place. No spilled iron!

Molding equipment is little different from that at home, except that most of the machines are old. Some of the production foundries are fortunate in having machines obtained before the War from the United States or Germany, and in one plant there is a good sand handling train, which was used to capacity.

Chinese Are Cheerful

The Chinese are always ready to try anything, and they are always cheerful. In working on land mines, the author wanted some parting compound. Using an old trick of the malleable casting molders, some very fine sand was mixed with crude oil and burned until entirely dry, as shown in Fig. 8. An empty land mine body was used for a furnace and, as usual, the Chinese officials joined in the experiment with great cheerfulness. On the extreme right is Mr. Chen, chief electrical engineer of the Arsenal, and next to him is the superintendent of that foundry. It was a pleasure to work with the Chinese foundrymen, right from the highest officials to the laborers.

One of the greatest problems in foundry production was the manufacture of trench mortar shells, which were urgently needed. As most of the sand available had a strong tendency towards fusing on the surface of the castings, and as inspection was very strict, the author suggested to the foundries of the National Resources Commission and the Ordnance Department of the Chinese Army, that trench mortar shells might be made in permanent metal molds. The advantages of such a process are obvious. There would be no rejections due to poor molding sand, the shells would be cast nearly to final size, so that machining operations could be greatly reduced, and due to the more rapid cooling, the graphite structure was very fine and the iron appreciably stronger. At the time of the author's departure, experimental molds were in operation in the three largest foundries, and results were very promising. One of the first experimental permanent molds was made at a large Arsenal. Two of their very able engineers are shown in Fig. 6 with the mold and some of the shells made in it.

We are so accustomed to having prompt analyses of our casting, that it is difficult to realize what the lack of such analyses can mean. Many of the plants in China had laboratories, but in one the supply of certain chemicals had been exhausted, so that no manganese or phosphorus could be run; in another there was no suction, and it took a long time to get results. Carbon combustion tubes had worn out, and attempts were being made at local manufacture.

Some foundries had good testing equipment, but as a rule this had been too heavy to move, and quality was cleverly tested by fracture, or chill, or file.

In one large and progressive company there was an excellent microscope but no films. The author was anxious to record the difference in graphite size between shells made in sand and those from permanent molds. After some argument, our Signal Corps kindly donated a film pack. Films had to be changed from film-pack to microscope plate holders, which were the wrong size. This problem was cleverly solved in typical Chinese manner by the young engineer, who fashioned an "adapter" from part of the wing of a crashed plane. Then came the lack of a dark-room. This was solved effectively, if not gracefully, by the author, who would crawl as far as possible into an empty oil drum, holding the films and containers. The Chinese would then cover the junction of the author and the drum with a series of black cloths. (Both

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Send for their performance records . . . compare . . . then just be guided by your own good judgement.

IMPERIAL BELTING COMPANY

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the Chinese, and the Signal Corps expressed deep regret that they could not get a photograph of this!)

Every kind and type of casting was made, practically all for war production; for example: Steel pick axes, refinery equipment, gun parts, and cast iron trench mortar shells, pipe, fittings, rolls, etc.

Cleaning the castings was accomplished by hammering, or chipping with a chisel. This was remedied to some degree by the use of the porcelain residue sand or powdered coal. A sand blast would have been of very great value. The burned-on sand was especially obnoxious, due to the great shortage of tool steel for machine work.

In spite of financial troubles, shortages of material, air raids, and having to move along many times in the past 8 years, the personnel of the foundries, from top to bottom, has preserved its natural courtesy and good humor. The managers showed the author every courtesy and provided excellent lodgings and fine food. The supervisors were co-operative and friendly, and the workers were anxious to follow instructions and were always in high good humor. The manager of an isolated foundry told the author not to be surprised at an enthusiastic and noisy group of children following him, because, to those children, he was equivalent to a circus!

When one looks back at more than 8 months spent in Chinese foundries in wartime, one forgets the slight discomforts and risks. There are many high spots to remember: The U. S. Army and Navy and Air Transport Command, and the wonderful job they were all doing; Dr. Wong-Wen-hao, Minister of Economic Affairs; General Yu-Ta-wei, chief of Ordnance; the courteous managers, and the energetic, good-humored workers.

101

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New Standards Group Organized

Constitution for a new and expanded international standards organization was drafted at a meeting in New York recently, and a new name, the International Standards Coordinating Association, was announced.

The meeting was called by the United Nations Standards Coordinating Committee, which had been organized more than a year ago to promote more uniform standards among the Allied nations as a phase of the war effort. The prewar international standards group was known as the International Standards Association.

Originally scheduled for three days, the meeting was finally extended to four days, with the Russian delegation sitting in on the last day's discussions, making 13 countries in all represented.

The next meeting is scheduled for London between April 15 and May 15, 1946. At that time such questions as to what language should be used for official communication and whether the inch or metric system should be used, will come up for further discussion.

Meanwhile, communications on the further development of the organization will be conducted in six languages—English, French, Chinese, Spanish, Portuguese and Russian.

Headquarters for the new organization have not yet been decided upon, but in all probability will be either New York or London, which at present are the two principal offices of the U.N.S.C.C.

ASTM Schedules 1946 National Meetings

Forty-ninth annual meeting of the American Society for Testing Materials will be held in Buffalo next June 24-28, in conjunction with the seventh exhibit of testing apparatus and related equipment. The 1946 spring meeting will be held in Pittsburgh, Feb. 25 to Mar. 1. This will also be ASTM Committee Week during which the various technical committees will meet. Further announcements will be made concerning technical features of both meetings. Several extensive symposiums are being developed and there will be a large number of technical papers and committee reports.

How Is RECONVERSION Going With You?

Are you making a different class of work now since the war ended? Do these castings differ in size? in shape? in metal poured? in the finish required?

How about your sand practice? Does that have to change, too?

What about profits? Do rising labor costs make it important that you cut sand costs?

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NONFERROUS FOUNDERS

Plan Organization of Chapters

THE Nonferrous Founders' Society held a meeting of nonferrous foundrymen in the northeastern Ohio area at Cleveland on Nov. 5 for the purpose of discussing the organization of a chapter in that territory. H. G. Wellman, vice president, Wellman Bronze & Aluminum Co., Cleveland, presided at the meeting. This followed a similar regional gathering in Chicago, Oct. 22.

Edwin W. Horlebein, Gibson & Kirk Co., Baltimore, and president of the Nonferrous Founders' Society, outlined the work of the society and described the contributions of the nonferrous industry to the war effort. He pointed out that using 1940 as a base of 100, operations of brass and bronze foundries in the year 1941 were at the rate of 200 per cent, 525 per cent in 1942, 367 per cent in 1943 and 384 per cent in 1944.

Mr. Horlebein also indicated that termination of war contracts has resulted in a decrease in the production of nonferrous castings. Statistics available indicate that production in August, 1945, as compared with the average for the first six months in 1944, ranged from 90 per cent for the smaller shops whose yearly production is less than $100,000, to 58 per cent for plants having a yearly production in excess of $500,000. A production average for the $100,000-$250,000 bracket is 87 per cent and for the $250,000-$500,000 bracket is 76 per cent.

Arthur E. Pye, secretary-treasurer Nonferrous Founders' Society, Chicago, discussed the idea of a chapter and suggested suitable rules for the conduct for such an organization. L. M. Nesselbush, vice president, Falcon Bronze Co., Youngstown, O., and chairman of the Cost Committee of the society, outlined the work of his committee in the development of a simplified accounting procedure and cost methods manual which now is available. He also stated that further work is underway toward amplification of the cost methods procedure. Frank G. Steinebach, editor THE FOUNDRY, discussed the importance of co-operative effort in the nonferrous industry in the period immediately ahead.

Following a discussion in which practically all of those in attendance participated, it was voted to organize a chapter of the Nonferrous Founders' Society. H. G. Wellman, Wellman Bronze & Aluminum Co., Cleveland, was elected chairman and Edward J. Metzger of the same organization was made recording secretary. Three additional members will be elected shortly to comprise the full executive committee of the chapter.

Discuss OPA Controls

The Chicago regional meeting Oct. 22 attracted about 60 members of the society from Illinois, Wisconsin and adjacent territory, and was held at the conclusion of a two-day session of the board of directors. C. K. Faunt, Christensen & Olsen Foundry Co., Chicago, presided.

Following introduction of the directors present, talks were given by various officers and committee members, including President Edwin W. Horlebein, Vice President Thomas S. Hemenway, Secretary-Treasurer Arthur E. Pye, and L. M. Nesselbush, chairman of the Cost Committee. Mr. Horlebein described the current status of OPA price control relative to nonferrous castings, and explained that the lifting of ceilings on light metal castings was entirely the result of an excess of supply over demand, a condition not yet fully prevailing in brass and bronze castings. Subsequent discussion indicated that not all foundries are applying the highest prices allowed them by OPA and that there are grounds for the hope that all price control will be lifted in the near future.

Mr. Hemenway discussed the significance of various developments at Washington, including the Labor-Management Conference. Mr. Pye spoke briefly on the society's plans for establishment of chapters in different sections of the country to enable nonferrous foundrymen to get together more frequently for discussion of mutual problems.

This Stearns Lifting Magnet is giving a lift to production in a foundry operation.

Don't move this kind of material with laborious, time-consuming, inefficient and hazardous hand labor methods when a Stearns magnet will do it so much more economically.

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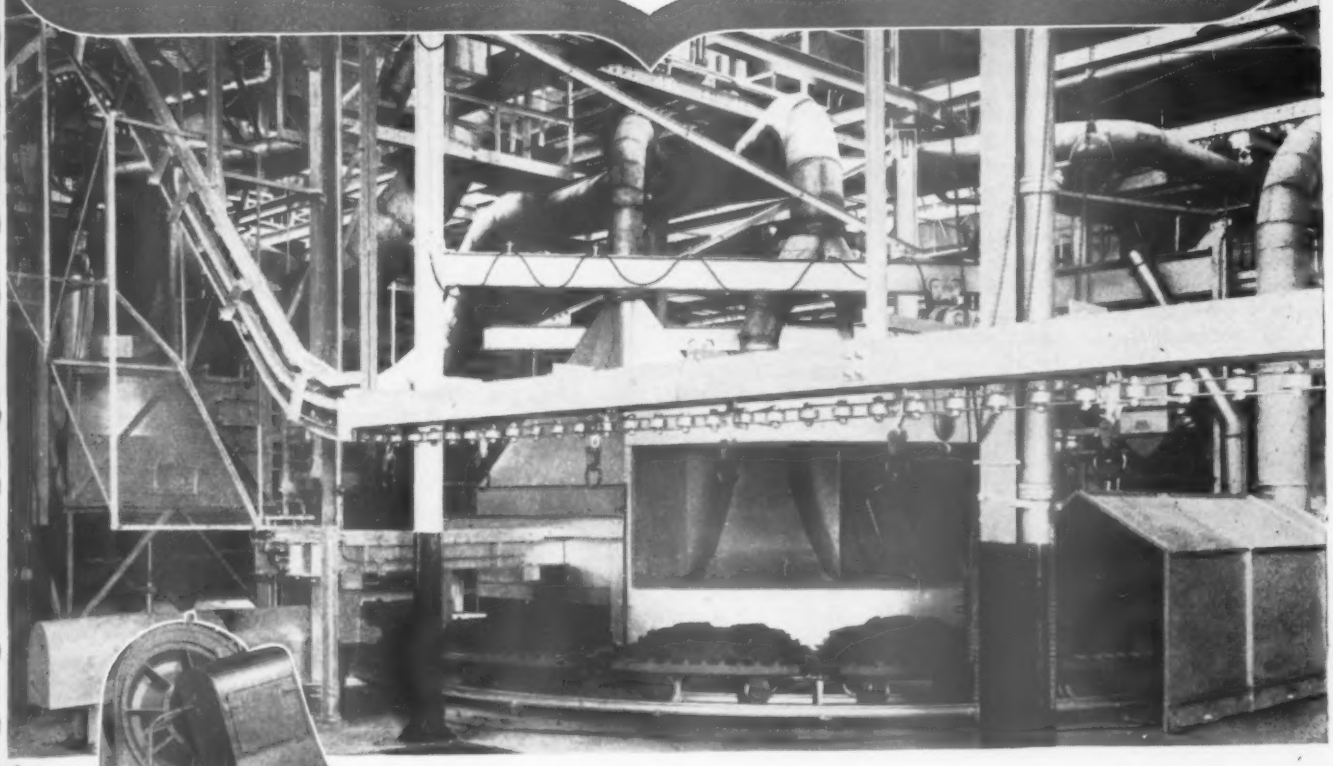
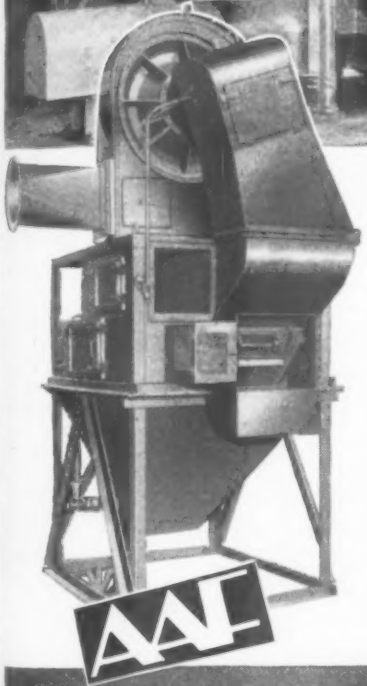
ROTO-CLONE*
for automotive foundry
DUST CONTROL





IN heavy duty shakeout service Roto-Clone has proved its value through years of successful performance. The Type W Roto-Clone, which can be seen in the background at the left of the picture above, exhausts the cope and drag shakeout and the casting removal station. This Roto-Clone dust control installation is typical of many such systems serving leading foundries throughout the country. For information on the Type W Roto-Clone (wet-type) for foundry service, ask for Bulletin No. 274A.

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MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

TYPE W ROTO-CLONE

The adventures of BILL

BY PAT DWYER
Drawings By RICHEY

IF YOU had the time and the opportunity," Bill remarked the other night, "and of course a fair size nail keg, duffle bag or other suitable container stuffed full with the Long Green, how would you like to take a gander down, around and through South Africa? Remarkable country, according to all accounts. Diamonds in the clay in every back yard. When the owner occasionally digs up a handful, he throws the little ones, anything under 2 carats, back in the hole, or feeds them to his chickens in lieu of gravel or oyster shells. Gold is so plentiful and common that the Kaffir and Zulu belles disdainfully say 'No'. They prefer anklets, bracelets, and tall, spiral necklaces made from telegraph wire hacked from the lines erected by a kind and paternal government for the transmission of vital information. Especially vital when the big black boys out in the bushes are brewing strong black medicine, doing a war dance, fitting new strings to the long bows, putting a little keener edge on the assegais and indulging in other gestures—suspected—and usually with good reason, to annoy or disturb the reigning monarch of the British Empire, his or her crown and dignity, and to imperil the safety of the realm."

"It may be," I admitted, "that some of the local Romeos still curry favor with the long neck black belles, by nipping a strand or two of telegraph wire from between the poles and presenting it as a neck ornament. I often have wondered how the local blacksmith managed to wind the stiff wire in a closely laid spiral around the lady's long neck. With the exception of the color, any one of these ladies could give Annie Laurie a run for the money. If my memory serves me correctly the author of the old ballad enumerating Annie's charms, mentioned that her neck was like the swan. Very poor comparison, if you ask me. A swan's neck is about as long as a shovel handle and as crooked as Ol' Man River. However, you are shooting away outside the target when you drag in war talk and native uprisings.

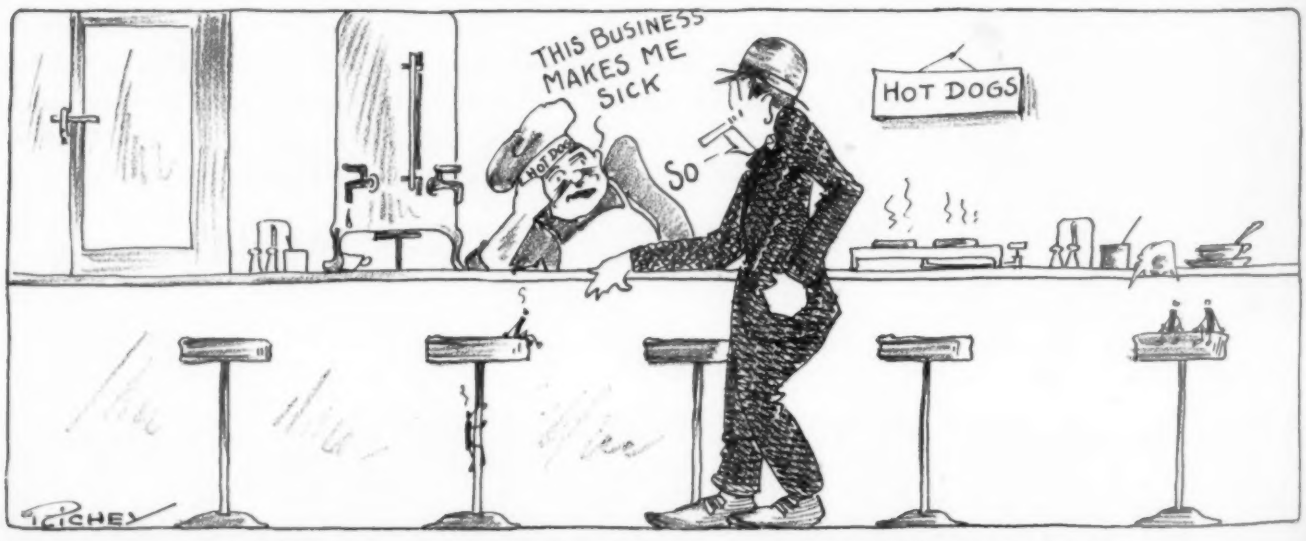
"Peace has reigned in the Transvaal for over 40 years, ever since *He,* greater even than Rider Haggard's *She,* slacked off his hold on the life line. Back in the quiet hills, thousands of miles from the primrose bordered paths in the old English rectory garden, simple and rugged, a massive granite boulder rests over all that is mortal of the son of an English clergyman who came to the country for the sake of his health, who was a millionaire at 19 and who lived to dominate the industrial and political affairs south of the equator for the greater part of the 30 years he spent directly and indirectly in public life. His bones long since have moldered into silent dust and mingled with the soil of the land he loved. He acquired wealth and fame. He made powerful friends and still more powerful enemies after the fashion of strong men from time immemorial, but he did not live to see the completion of his life-long dream, a railroad from the Cape to Cairo. Yet, who can say that today on that account, the great empire builder sleeps less peacefully under the immense granite boulder bearing the simple inscription 'Cecil John Rhodes'?"

"He must have been a genuine sharpy, a foxy young lad," Bill said, "if he had collected, cornered and salted away a million dollars by the time he was 19 years old. At that age the average young man still is in school earning nothing and a heavy drag on the old family wallet. I know hundreds of honest, hard-working lads, including if you please the present speaker, old enough to be C. J.'s grandfather. All they have accumulated up to the present time is the six figures that follow the 1 in 1,000,000.

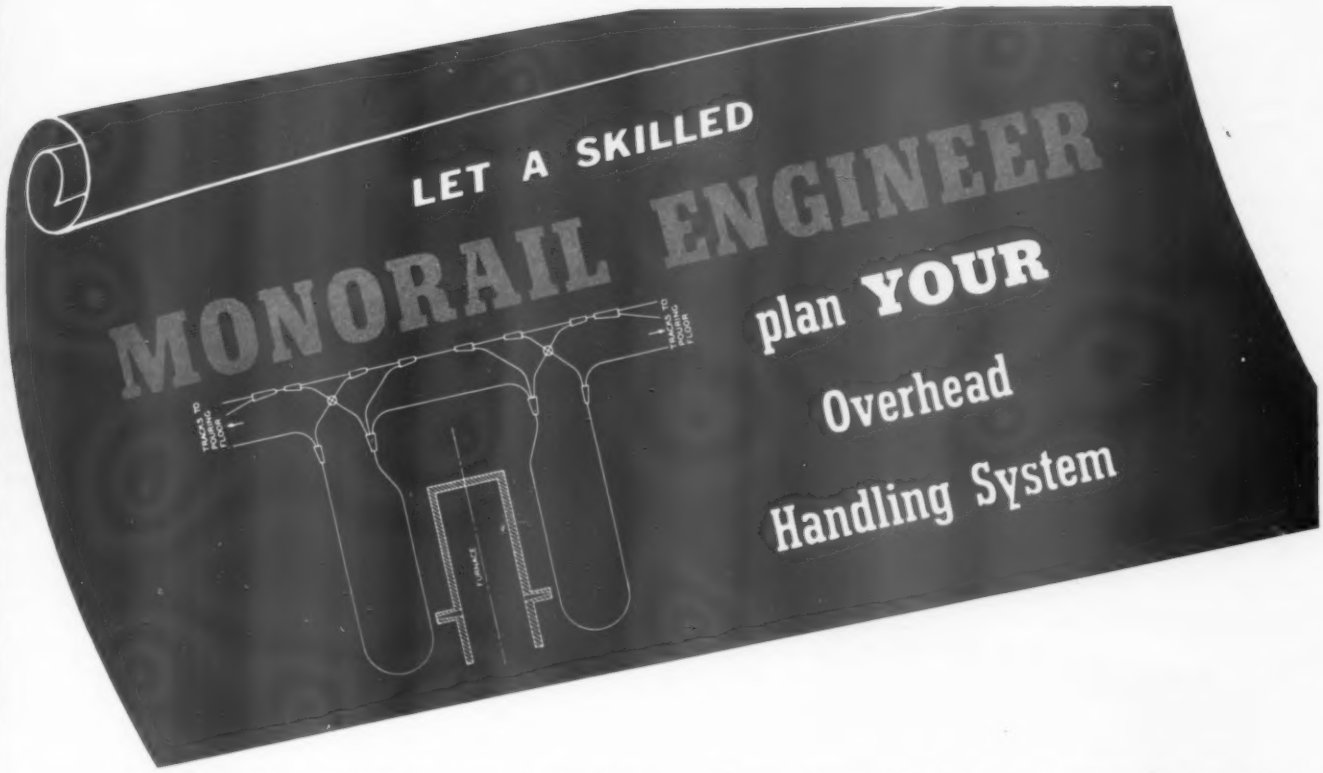
"I remember now where I heard about this here now Rhodes guy. One night I stopped at a hot-dog stand on the boardwalk in Atlantic City. The proprietor, a chatty kind of a bird, told me he was an ex-British soldier who elected to stay in South Africa after the close of the Boer war. He got himself a job as handy man, valet, coachman and all that kind of thing to Mr. Rhodes. Following the death of his patron in 1902, he set off for America to seek his fortune.

" ' 'Ere hi am,' he remarked bitterly, 'tied down, or on a leash as you might sy in this perishin' 'ole. If all the 'ot dorgs I have fried since hi landed 'ere, were laid hend to hend the line would reach from this 'ere blinkin' boardwalk to Table 'Ead on the Caipe o' Good 'Ope An' that would be a good place to leave 'em!' He claimed that the smell of the

(*Continued on page* 224)



After a life time spent in the midst of war's alarms, our retired hero winds up in the dog house



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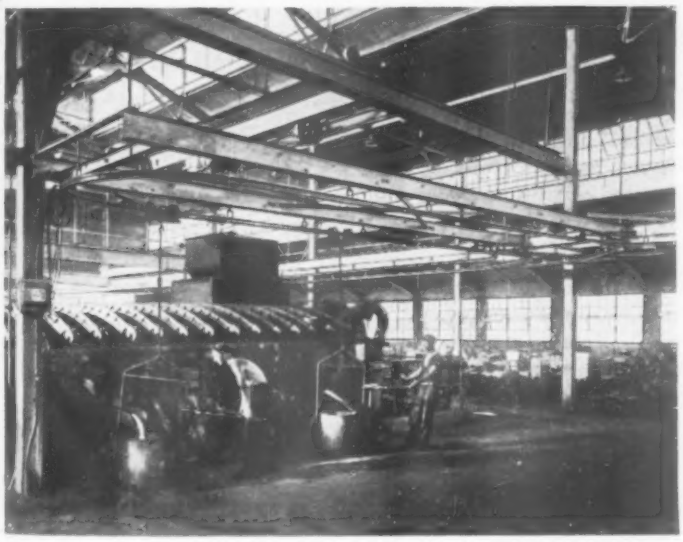


THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE CLEVELAND 7, OHIO

(*Continued from page 222*)

great national American favorite snack, the loathsome look of the thing daubed with mustard and stuck in a stale bun, made him kind of sick—"

"He is not alone," I interrupted. "Trying to follow you has not done me any good. First you ask me how would I like to visit South Africa. Before I can think up a more or less civil answer you drag in warlike wire stealers, disturbers of the peace, Zulu belles and amazingly anatomical Annie Laurie. So far as I can see, the only irrevelant items you have omitted are the Jameson raid and the famous old missionary hymn 'From Greenland's Icy Mountains to India's Coral Strand;' where Africa's sunny fountains roll down their golden sands.

"The author of that highly popular composition probably never was more than 3 miles beyond his or her native village green. Greenland's icy mountains do not strain the imagination, but thousands of boys streaming home from the Far East snort a very expressive and contemptuous 'Ha' when anyone mentions *Inja's* coral strand. As a result of singing the hymn in the innocent days of their youth, I wonder how many men and women have grown up, lived and died in the firm belief that the face of Africa is dotted with natural fountains throwing up jets of sparkling water heavily impregnated with fine gold, apparently all free to any chance stroller who cares to tarry and scoop up a handful."

"Well," said Bill, "now that you mention it, that was the picture the hymn always brought to my youthful mind. The first clear conception I had of conditions was obtained from a racy article in THE FOUNDRY about 20 years ago from the able pen of George W. Carson who went over from Detroit to take charge of a foundry. Touching on the gold feature George wrote: 'The great gold reef extends east and west for 40 miles from Randfonstein on the west Rand to Springs on the east. The comparatively narrow area of the reef is covered with a continuous line of smoke stacks and hoisting machinery, while the earth is in constant tremor under roaring batteries of stamp mills.' "

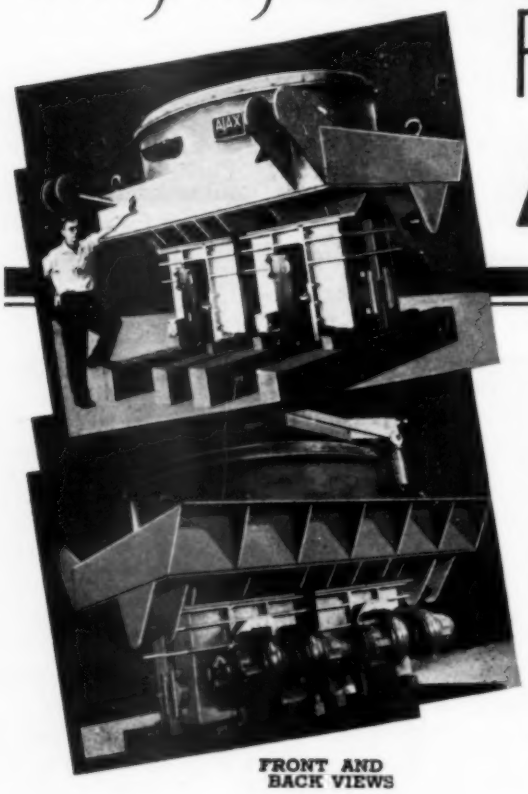
"So there y'are my boy. Hundreds of millions worth of the precious metal

A little session in the beauty parlor

have been taken out of this greatest of all gold deposits, but it was not scooped out of a fountain with a tin dipper by a tourist in a pair of shorts and a white pith helmet strolling negligently through the country. And that brings us back to where we started. Now that the war is over and a man can indulge in ordinary conversation without laying himself open to suspicion as a spy in the pay of the enemy, perhaps you can come out of your shell long enough to tell me what turned your attention in the direction of South Africa."

"Well," said Bill, "I'll tell you. The great postal service which, without a doubt, is one of mankind's most wonderful inventions, a service that functions despite the well known combination of intense fire and water well above the flood stage, recently laid down in my humble cot a very attractive brochure, 16 pages 6 x 9 in., setting forth in text and illustration the history of the Standard Brass, Iron, & Steel Foundries Ltd., Benoni, over the past 30 years. Modestly and yet with legitimate craftsman's

Low Frequency INDUCTION MELTING FURNACE *by* AJAX



FRONT AND BACK VIEWS

THIS unit (the largest of its kind ever made for melting aluminum alloys) is powered with 500 kilowatt three-phase 60 cycles alternating current, melts over 2500 pounds of aluminum alloy per hour and allows to cast ingots up to 6000 pounds individual weight. Tilting is exactly around the pouring spout and casting speed is adjusted within close limits by hydraulic rams with sensitive pump control.

Temperature, of course, is also automatically regulated and there is no chance for overheating the bath at any time during the melting cycle.

● Ajax Tama-Wyatt Induction Furnaces are made in a wide range of sizes to meet the demand for large volume or small special lots of aluminum alloy ingots. Ajax Tama-Wyatt Furnaces can be operated continuously, without frequent interruptions previously necessitated for reconditioning melting channels.

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Associate Companies: AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hoffman Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

pride, Managing Director A. H. Moore dwells on the early days of the enterprise. Here, I'll read it for you.

" 'I read with considerable interest an article published in the July, 1944 issue of THE FOUNDRY, describing the casting of a large bronze pump body. The metal was melted in a cupola and the method very closely resembles the practice adopted by the writer and his partner, F. W. G. Hobbs, in 1913, but under very different circumstances to those described by the California writer. Starting out in 1913 with very little equipment and no capital, we experienced very lean times for many months. We had two small pit fires and a few incidental pieces of equipment in a shack which also served as a home, kitchen, dining room, bed room and parlor. We had no swimming pool, although at times sufficient rain leaked through the roof to fill one.

" 'About this time we tendered on a job, a bronze pump body weighing about 4½ tons, and were given the order. Catching the order was one thing, but delivering the goods brought up visions of some of the heavier jobs tackled by Hercules, Ajax, Ulysses, Jean ValJean, and other historical characters. More recently the gang that floated the *Normandie* must have had the same feeling, hoping for the best, but a little shaky on the articles of faith. It was very helpful at this stage to discover that many suppliers of foundry materials were willing to extend credit. We commenced business on a credit and borrowing basis.

" 'We built a cupola out of corrugated steel sheets and lined it with brick. The cupola was used first to melt iron to make the flasks and arbors. With no motive power available we acquired an old motor car. This was securely staked down and the back wheels jacked up. A belt attached to one wheel was connected to a fan (borrowed) and there we had a complete if somewhat unorthodox melting unit. We found a big ladle of prehistoric vintage in a junk yard. A kindly disposed mining company lent us an I-beam and chain block, which had no crawl. This noble device was adjusted in place for handling the mold, ladle and casting.

" 'A pit was dug in the floor large enough for the job and deep enough to bring the top of the mold to floor level, also near enough to the cupola to permit handling the ladle with the stationary hoist. After the three-part mold was rammed in the usual manner, the cope was lifted and placed on skids and shoved over clear of the pit. The position of the chain block then was changed and the cope was rolled over and finished. The block was moved back over the center of the mold and the cheek was lifted high enough to permit work on the drag and the striking up of the main body core. The mold was finished, blacked, dried, reassembled and then clamped firmly with four cast iron stringers from cope to drag. Runner basin and risers were made up with special care. The cupola was chipped out and daubed with the most minute attention to every detail.

" 'Having done everything within the limits of human skill and experience the partners went through the before-the-battle period of suspense that lies between the time the ladle is tipped until the metal appears in the risers. Happily in this instance the entire operation was a complete success. The casting was perfect. Later it was machined and installed and for the past 30 years has been lifting 80,000 gallons of water per hour against a 2000 ft head. Had it been a failure, Moore and Hobbs probably would have folded their tents like the Arabs and silently stolen away.'

"A most remarkable performance," Bill continued, "any way you look at it. To tackle a 4½-ton bronze casting in a shanty about the size of one of the up-country Kaffir kraals, and with practically the same amount of equipment, to tackle the thing you might say with the bare hands, and to get away with it, certainly is an item for the book."

"What did the partners do after the job was finished?"

"Plenty, my boy, plenty. You don't think that a pair of hustlers with an established record of being able to move anything with two loose ends, you don't think they were content to sit there waiting for a prize to drop into their laps,

Ajax ALUMINUM BRONZE ALLOYS

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STABILITY AT HIGH TEMPERATURES

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Investigation of Aluminum Bronze Alloys is warranted by foundrymen and designers where metal parts are subjected to either recurrent stresses or compressive forces and resistance to fatigue is sought; where the ability to withstand high temperatures or, where a high degree of corrosion resistance to many chemicals may be a significant factor in material selection. Supplied by Ajax in alloyed compositions of copper, aluminum and iron, as well as special alloys containing nickel and manganese, a complete selection of Aluminum Bronzes is available to meet all existing specifications as listed by Non-Ferrous Ingot Metals Institute, ASTM and the Federal Government.

Ajax, in adhering to its policy pioneered in the very infancy of the non-ferrous metal industry, exercises the closest scientific control over the production of these alloys. Metal men may look to Ajax with continued confidence not only for supply of highest quality Aluminum Alloy ingots, but also for practical technical know-how on correct foundry practice for producing better castings with fewer rejects. Request booklet "Ingot Metals of Today".

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Ajax Plastic Bronze
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Ajax Manganese Bronze
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Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
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or to spend their time in line before the dispensing unit of a government bureau waiting to collect out-of-work compensation.

"In 1924 an iron foundry, machine shop and pattern shop were erected, and these were doubled in size the following year. That year also saw the installation of a modern laboratory. A 7-acre site was purchased for the erection of a new plant and the partnership was turned into a private company. More recent additions to the plant include a modern steel foundry, a commodious office building and a new, modernly equipped brass foundry with a normal capacity of 125 tons per month.

"A. H. does not say so in the booklet, but I am willing to bet that several times a day as he sits in his luxuriously appointed office, his roving and appreciative eye rests on a stand supporting an old battered wooden box containing the trowels, the slicks and the lifters, all carefully oiled. Tools which for many years were held in the competent and skilful hands of a man who was molder, coremaker, melter, carpenter, patternmaker, casting cleaner, salesman, time keeper, paymaster and shipping clerk, or in other words an old-time all-around foundryman. Like the fella in the poem who wanted a job done. He spit on his hands and did it!"

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Chicago, Ill.	Foundry Supplies Co.
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Cincinnati, Ohio	Delhi Foundry Sand Co.
Coldwater, Mich.	The Foundries Materials Co.
Detroit, Mich.	The Foundries Materials Co.
Dallas, Texas	Barada & Page, Inc.
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Houston, Texas	Barada & Page, Inc.
Kansas City, Mo.	Barada & Page, Inc.
Long Island City, N.Y.	F. E. Schundler & Co., Inc.
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New Orleans, La.	Barada & Page, Inc.
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BENTONITE

DUST REMOVAL AT BELT TRANSFER POINTS

(*Continued from page* 107)

two types of dust producing points with reference to belt transfer. First, the heavy dust point at the terminal of the conveyor coming from the shakeout. Second, the remaining transfer points at which the sand dust load is nearly equal or at least tapering off slightly at each point with reference to the preceding point but insufficient to warrant reduction in the air velocity or volume for subsequent points.

The accompanying illustration shows a typical belt, transfer point hood. The design applies to belts operating in a line but at different levels. Obviously the belts could be at any angle to each other which would change the design of the hood somewhat. Dimensions given in the table will cover the different foundry types and are self-explanatory. The top of the hood where the exhaust pipe is taken off is designed with a flaring side. This eliminates the high eddy current which might pick up good sand at the inlet to the hood.

Hood and Skirt Too Low

Conveyor manufacturers usually provide some sort of hood with belt skirts. Invariably both the hood and skirt are made too low. The skirt is made almost the same height as the heap of sand carried by the belt and is practically useless. The skirt should be liberal in dimension to avoid possibility of piling up sand and causing high velocity currents which would tend to pick up good sand. All that is necessary is sufficient air velocity to take off the fine dust as the sand distributes onto the belt and to prevent this dust from escaping into the atmosphere. The open end of the skirt may be closed by a leather flap which should be a part of every such device.

Every dust take-off point should be provided with an air inlet. Obviously, air cannot be taken out unless air is permitted to enter the hood at some point. Usually there is ample clearance around the skirt, at the bearing positions and back of the pulley for this purpose, but the dust engineer should investigate and make sure that this is the case.

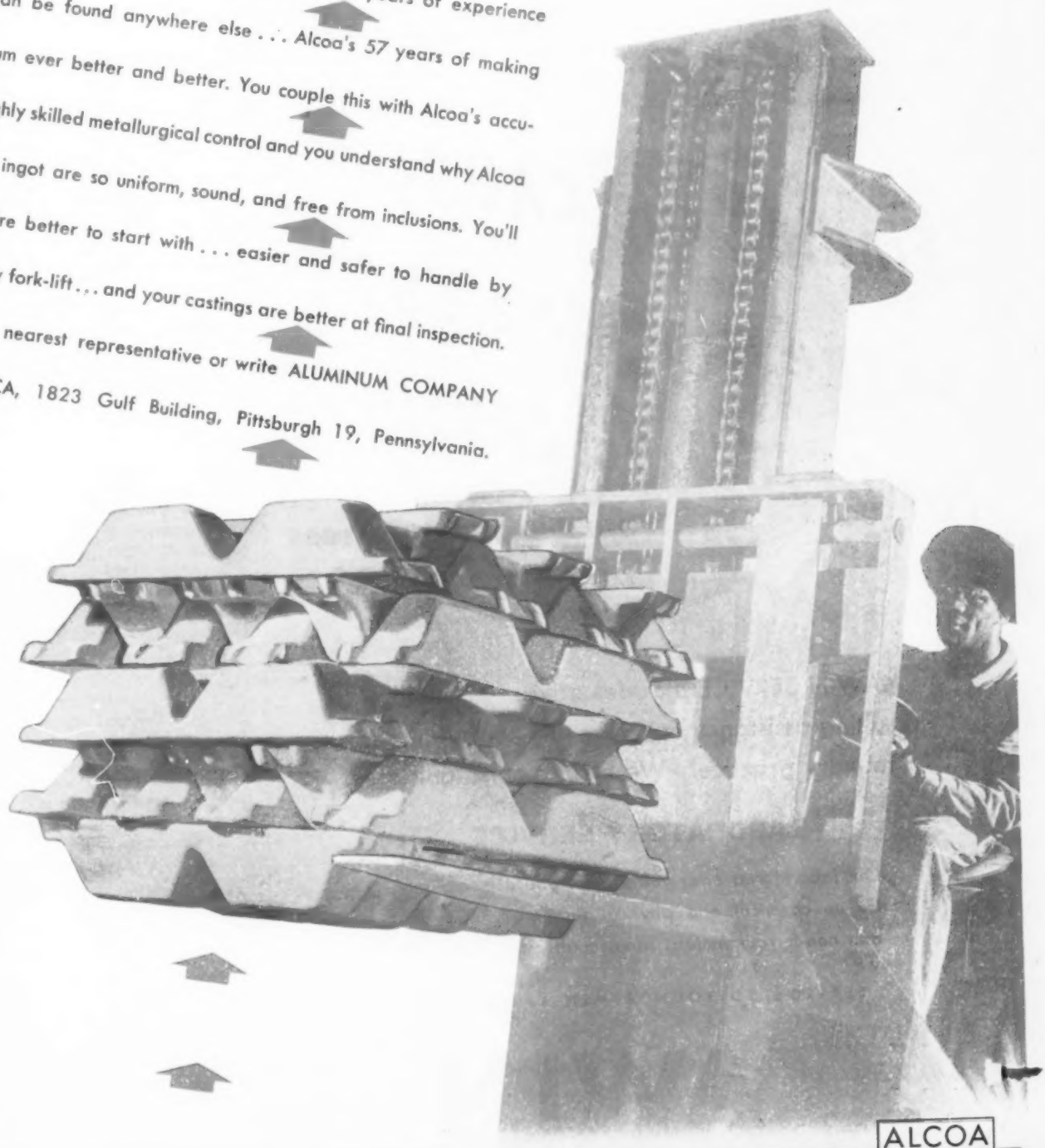
Importance of these belt transfer points is often underestimated, with the result that a skimpy design both in materials and matters of accessibility is produced. Materials should be heavy enough to stand the abuse received, certainly not lighter than 16 gage iron. Maintenance crews must get into these hoods to effect bearing and belt repairs. Make the hood with removable sides so that they may be removed by taking out bolts. Use a right angle bend on the body of the hood so that the bolts and

(*Concluded on page* 228)

COMING UP . . . *more of the best!*

ALCOA Pig and Ingot The best aluminum pig and ingot, because into their production go more years of experience than can be found anywhere else . . . Alcoa's 57 years of making aluminum ever better and better. You couple this with Alcoa's accurate, highly skilled metallurgical control and you understand why Alcoa pig and ingot are so uniform, sound, and free from inclusions. You'll find they're better to start with . . . easier and safer to handle by hand or by fork-lift . . . and your castings are better at final inspection.

See our nearest representative or write ALUMINUM COMPANY OF AMERICA, 1823 Gulf Building, Pittsburgh 19, Pennsylvania.



ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

(*Concluded from page 226*)

nuts may be removed without going inside of the hood with one arm and the head.

Air velocity for the gray iron or steel foundry should be from one-fourth to one-third higher than that used for the nonferrous metal foundry. Satisfactory operation has been obtained with a volume of 300 cu ft per foot of belt width for the ferrous foundry and 250 cu ft per foot of belt width for the nonferrous foundry. The discharge end of the conveyor from the shakeout is given a volume increase of 25 per cent over these figures. The inlet velocity through openings in the hood should be not less than 200 fpm and 150 fpm, respectively.

Velocity or volume figures mean little or nothing unless attention is paid the design of the exhaust piping and the method of getting air flow to the ventilating hoods. Many a good system is not operating properly because it creates a vacuum in the building. Adequate means should be provided for admitting fresh air to the building. In fact, this feature should become part and parcel of the dust collecting system.

Exhaust piping should be sized to handle the full volume of air at a velocity of not less than 3750 fpm. Higher velocity may be used to procure lower pipe construction costs, but more rapid abrasion of the pipes will result so that overall economies will be reduced. Pipe resistance must be calculated carefully and accurately. The system must be completely balanced after construction to be sure that each and every point is receiving the correct suction and that the correct amount of air is being exhausted.

Finding the CAUSE—
suggesting the CURE
for DEFECTIVE CASTINGS
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LABORATORY SERVICE

Our laboratories offer you prompt and accurate service on chemical and physical testing of all ferrous and non-ferrous metals, sand, coal, coke, fluxes, etc.

SERVICE TO FOUNDRYMEN SINCE 1903

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BUFFALO LABORATORIES—110 PEARL STREET

WHAT TYPE CHARGER AND BUCKET?

(*Continued from page 87*)

charger, to serve one or more cupolas.

(f) Jib crane charger, to serve two cupolas.

Referring to the various types of charging buckets, each has advantages and disadvantages depending upon various conditions, such as the importance of metallurgical control, the kind and size of scrap and the layout of the charging yard and cupola building.

1. Cone-bottom Bucket

Advantages:

(a) This type of bucket does an excellent job of distributing the stock in the cupola. The charge is tight around the circumference of the cupola and more open in the center. This results in better penetration of the blast and more uniform combustion across the entire area of the cupola. The cone-bottom bucket does a job mechanically that formerly was accomplished by the *best* hand-charging practice.

(b) The cone-bottom bucket, in common with several other types, can be discharged in a very simple manner by using a wishbone-shaped casting attached to the shell of the cupola. It is only necessary for the crane man to place the bucket on the wishbone casting and lower the cone. No latches or trip lines are employed.

(c) The load is suspended from the bottom, which means there is no chance of premature discharge of the stock. This is an important safety feature.

(d) The charging crane operator can dribble the stock from the bucket by moving the cone up and down. This minimizes the shock when the first charges are delivered into the cupola.

Disadvantages:

(a) The stem in the center of the bucket attached to the top of the cone interferes to some extent with the delivery of some kinds of material into the bucket with magnet loading.

(b) A minimum of 11 to 12 in. on a side is required to allow space for the discharge of the material into the cupola. This means the diameter of the charging bucket must be less by 22 to 24 in. than

(*Continued on page 230*)

Major
PRODUCTION
Operations
DEMAND THE BEST
And "the best" in Chaplets, Chills and Superchills (patented) has long been identified with the fine old name of Fanner.
Today, more than ever, when there can be no compromise with either time or quality in turning out the best possible castings in the shortest possible time, the need for these vital Fanner products is a very essential "must" in every successful production speed-up.
Our engineering experience is "at your service" in helping you take full advantage of speeding up your casting program with Fanner Chills, Chaplets and patented Superchills. Call on us.
PRODUCE for VICTORY but PLAN for PEACE

THE FANNER MANUFACTURING CO.

Brookside Park, Cleveland, Ohio • The Canadian Fanner, Ltd., Hamilton, Ontario

(*Continued from page* 228)

the inside diameter of the cupola at the charging zone.

(c) The volume of the cone itself represents a loss in capacity of the charging bucket.

(d) Tangled scrap and large pieces do not have free delivery from the cone-bottom bucket.

(e) When material is discharged from the cone-bottom bucket it impinges on the sides of the cupola, which is necessarily somewhat hard on the lining at the charging zone. This is usually taken care of by installing 4 to 6 ft of cast-iron blocks at the charging location.

Perhaps the disadvantage listed under (d) should really be classed as an advantage because it must be admitted that any piece of scrap which will not discharge readily through the cone-bottom bucket should not be charged in the cupola. All particular operators recognize that good cupola operation makes it desirable, and in some cases even imperative, to break up large pieces of scrap before charging them into the cupola.

2. Single-Door Drop-Bottom Bucket

Advantages:

(a) This bucket has a relatively low cost of manufacture.

(b) The diameter of this bucket can be nearer to the inside dimensions of the cupola lining than some other types of bucket. All that is required is clearance. When the door drops to discharge the load, it swings out through the charging opening.

(c) The door automatically latches at the bottom of the travel and unlatches by striking a bumper block in the cupola at the top of the travel.

Disadvantages:

(a) This type of bucket has a tendency to pack the charge very tight in the center of the cupola and more open at the circumference. This results in the blast channeling around the circumference of the cupola which may be very destructive to the lining.

(b) The load is dropped from charging door height with considerable impact, and because the stock is discharged all at once it has a tendency to break up the coke when the first charges are delivered into the cupola.

(c) There is always a danger that the latch is not properly secured, which may result in discharging the load prematurely.

(d) The bucket must necessarily strike the bumper block in the cupola with considerable impact in order to release the latch.

3. Double-Leaf Drop-Door Bucket

Advantages:

(a) It eliminates the wishbone. (This may or may not be an advantage).

(b) Tangled scrap and large pieces can be charged with this bucket. (As indicated under Cone-Bottom Bucket, this may or may not be an advantage).

(c) This type of bucket permits a short time cycle because there is no jiggling necessary to discharge the scrap.

(d) The bucket has the full cubic capacity for any given size of bucket.

(e) There is no stem to interfere with the delivery of scrap to the bucket with magnet make-up.

(f) No labor is required to hook and unhook the bucket from the charger.

Disadvantages:

(a) The first cost of this bucket is higher than others because of the machine tool time required on the lifting beam and miscellaneous levers.

(b) The bucket must be less in diameter than the inside diameter of the cupola. One of the doors can swing through the charging opening, but the one on the opposite side must have room for its swing.

(c) The load is dropped from charging door height with considerable impact, and because the stock is discharged all at once there is a tendency to break the coke when the first charges are delivered into the cupola.

4. Over-the-Lip Discharge Bucket

Advantages:

(a) First cost of this type of bucket is lower than for any other.

(b) Can do a good job of distributing the charge in small cupolas.

(c) Practically any type or size of scrap can be charged.

Disadvantages:

(a) This type of bucket is hard on the cupola lining.

(b) Depending upon the speed of the

(*Concluded on page* 232)

SERVICE NETWORK

Within the areas served by the ten Hickman, Williams regional offices lies the vast bulk of America's foundry industry. These ten service offices are staffed by trained men whose principle duty is to maintain close contact with our customers thus enabling them to give each transaction close personal attention.

Whatever problems you may have dealing with ferro alloys, pig iron, fluorspar, coal, coke, shot and grit can be expertly solved by simply calling in the Hickman, Williams representative in your area. You'll find, moreover, that these experienced field men can be most helpful in making suggestions that prove valuable in efficient foundry operation.

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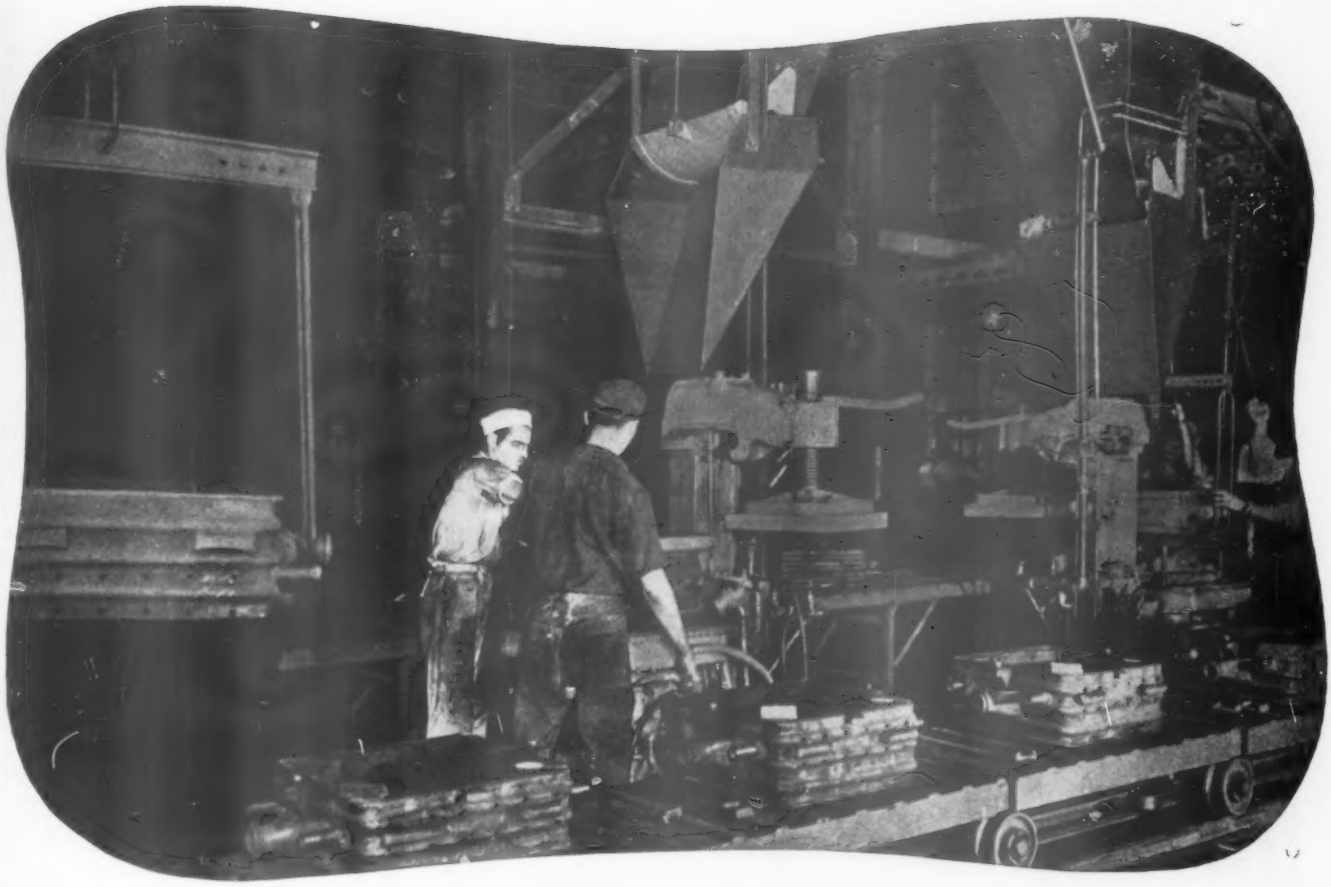

Eliminate Back and Head Aches

Save your men the tiring, tedious work of lifting, bending, shoveling with Bartlett-Snow foundry equipment,—and you'll reduce your own headaches too. Individually engineered to your particular and individual requirements, based on our long and successful experience in this work, a Bartlett-Snow installation will give you a maximum of both quantity and quality from your plant. Costs go down. Your product finds readier sale. The workmen get larger take home pay—easier—like their jobs better. Absenteeism and turnover are much reduced. And the smoother, more even, more continuous production means bigger profits, larger dividends for you. Can we send you more details?

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THE C. O. BARTLETT & SNOW CO.

6201 HARVARD AVENUE • CLEVELAND 5, OHIO

ENGINEERING REPRESENTATIVES IN THE PRINCIPAL CITIES

FOUNDRY SAND, MOLD AND CASTINGS HANDLING

(*Concluded from page 230*)

hoist, the charge has a tendency to distribute on either the far side or the near side of the cupola. In either case, channeling results which is hard on the lining on the side where the charge is low.

5. Griffin Type Skip-Hoist Charger

This type of charger employs a charging car with a tray which is locked on the skip hoist platform as previously described. It is used in the car wheel foundries, or where large and heavy sectioned material is to be charged. Practically none of these chargers has been installed except in the wheel foundries and in a few steel plants where very tangled scrap and heavy pieces are charged. The charging car lends itself readily to magnet make-up. The disadvantages of this charger are similar to those for the Over-the-Lip Discharge Bucket mentioned previously.

Any of the foregoing charging buckets can be used with any type of charging crane or skip hoist. If metallurgical results are of prime importance, it is generally admitted that the cone-bottom bucket will give better operating conditions in the cupola and more uniform analysis of the metal tapped than any other type of charging bucket.

In order to obtain the most efficient results from any cupola, with minimum fuel consumption, minimum oxidation, maximum temperature and maximum lining life, we must be able to control the flow of hot gases as they travel up the loaded portion of the stack to obtain as nearly as possible, a uniform flow of these gases across the full cross-sectional area of the cupola. Blast furnace operators have recognized the importance of this fact for many years, and they realize that to obtain a uniform flow and distribution of gases they must charge their furnaces uniformly dense at the circumference of the furnace, and have greater permeability towards the center of the stack. This type of charging induces penetration of the blast to the center of the cupola and a more uniform combustion of the coke across the full area of the furnace. Recognition of this requirement has led to the development and almost universal application of the rotating top for blast furnaces.

Because cupolas are smaller than blast furnaces in diameter, a good job of distributing the stock can be accomplished with a less complicated system. The cone-bottom charging bucket does for the cupola operator what the revolving top has done for the blast furnace operator. If the component parts of the cupola charge are equally distributed in the cone-bottom bucket, the charge will be properly placed in the cupola and more uniform melting conditions will obtain over the full cross-sectional area of the cupola. Under such conditions there is no channeling of the blast or hot gases and the most uniform melting operation with a minimum of fuel is accomplished.

The type of charger and charging bucket to be used in any foundry should be decided upon only after a careful study of all of the conditions in the foundry in question. Most charging installations are "tailor made" jobs, as there is no one layout which satisfactorily meets all conditions.

MADE OF ASBESTOS
For increased handling speed!
Because Transite Core Plates weigh so much less than metal, they are easily handled—thus speed production. Whether making castings of brass, aluminum, gray iron, malleable iron, or steel, here are some advantages Transite Core Plates provide:
Lightweight—Much lighter-than-metal, they handle easier . . . permit heavier loads.
Less Breakage—Fibrous asbestos-cement structure resists severe shocks, minimizes cracking and breaking.
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Corrosion-Resistant—Cannot corrode because they're made of asbestos-cement.
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For further details, write Johns-Manville, 22 E. 40th St., New York 16, N. Y.
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TRANSITE CORE PLATES

Apprentice Training for Servicemen

Apprentice-training service, U. S. Department of Labor, has published a helpful booklet entitled "Apprentice Training for Returning Servicemen," written in collaboration with representatives of the educational branches of the War and Navy Departments and the Veterans Administration. Explanation of the financial benefits of veterans legislation which supplement apprentice wages, qualifications required of veterans for these benefits, as well as for apprentice training, and a list of over 100 skilled trades in which workers are trained through apprenticeship and ten major points which identify a bona fide apprenticeship program, are covered in the booklet. Copies may be obtained on request from Apprentice-Training Service, U. S. Department of Labor, 1778 Pennsylvania Ave., Washington 25.

El Monte Foundry plans construction of an addition to its steel foundry at 504 Orchard St., El Monte, Calif., 60 x 90 ft., to cost $10,800.

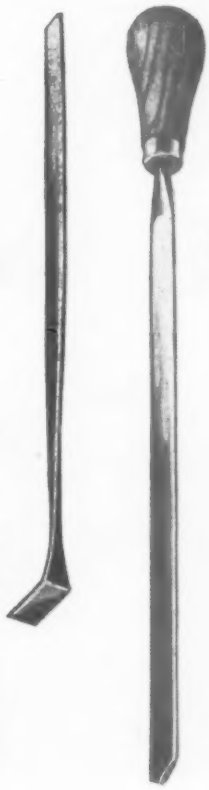
ONE PIECE FORGED TOOL STEEL

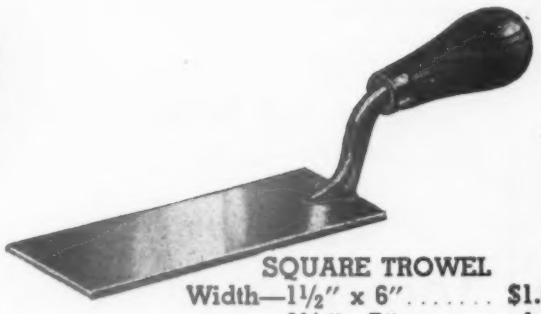
MOULDERS TOOLS

Immediate Delivery From Stock...

ROUND FINISHING TROWEL

Width—1½" x 6"	$1.80
1½" x 7"	1.85
2" x 7"	1.90





SQUARE TROWEL

Width—1½" x 6"	$1.80
1½" x 7"	1.85
2" x 7"	1.90

No. 40 STRAIGHT LIFTERS →

Length	10"	12"	14"	16"	18"
Width—¼"	$1.05	$1.15	$1.20	$1.30	....
⅜"	1.05	1.15	1.20	1.30	....
½"	....	1.30	1.35	1.40	$1.55
¾"	....	1.40	1.50	1.60	1.75

Special Lifter, ½" wide x 24" long—$2.50

←—MOULDERS VENTING TOOL
For
Steel and Semi-Steel Foundries

Length	16"
Width—⅜"	$1.20
½"	1.35
¾"	1.50

No. 15 BENCH LIFTER	Width	Each
	¼"	$1.05
	½"	1.15
	¾"	1.40

Prices subject to change without notice. This is our complete line of tools. New tools will be added to this list when justified by demands.

No. 1
SLICK & OVAL SPOON

Width	¾"	1"	1¼"	1½"
Each	$1.05	$1.15	$1.40	$1.55

No. 5
OVAL SPOON & TAPER SLICK

Width	¾"
Each	$1.15

No. 10
TAPER & SQUARE

Width	¾" Taper, ½" Square
Each	$1.15

The Freeman Supply Company

Pattern Shop & Foundry Supplies & Equipment

Mahogany and Pine Pattern Lumber

1152 East Broadway TOLEDO 5, OHIO Tel. TAylor 4624

CASTING TUYERES IN BETHLEHEM FOUNDRY

(*Continued from page* 113)

print for the center core.

This print, ¾-in. deep, is machined accurately with tapered sides to receive a small round plate on which the center core is rammed in an independent corebox. The corebox is provided with a similar print which insures that when the core is lifted from the box with a suitable center bolt and placed on the drag plate of the mold, it will be located accurately to give a uniform thickness of metal between the center core and the chamber core. This green core is made from a strong mixture of new and old sand and is provided with a 2-in. diameter vertical vent hole through the center and is not dried. The lifting bolt is unscrewed and removed after the core is in place.

Openings for the reception of the chamber core prints are drilled to a depth of 1 in. in the drag plate. A ⅝-in. hole in the center of each one is drilled the remainder of the distance through the plate. The corebox is placed on a small, flat iron ring with pockets corresponding to openings in the plate. A ⅝-in. tube threaded at the lower end and pierced with numerous small vent holes is placed upright in each pocket, and then the corebox is filled with sand and jolted on a machine. The sand is a half and half mixture of coarse bank and silica sand bonded with powdered rosin. When the corebox is removed the iron ring remains on the bottom of the core and supports it while it is drying in the oven.

The dried core is removed from the ring and lowered into place around the center core on the drag plate. The prints guide it accurately into place and the threaded ends of the tubes project below the plate where they are secured with nuts. Everything is straight, true and tight, an absolute insurance against thin spots either on the inside or outside walls of the casting.

A stripping plate jolt machine is employed to ram the cope in a plain, square cast iron flask with a single upright sprue in one corner. The cope is lifted from the machine by a small crane and lowered over the chamber core into place on the drag plate where it is held by two clamps. A row of drag plates is mounted on a permanent trestle elevated 18 in. above the floor for the convenience of the operator in attaching and disengaging the nuts which hold the chamber cores in place. The plates also remain permanently in place. The entire unit is the essence of simplicity and accuracy. After the casting is poured, casting, mold and core are removed as a unit. The plate then is blown clean with an air hose and made ready for the next assemblage of a tuyere mold.

Ladle Capacity Four Castings

Metal for the tuyeres, made up from a mixture of virgin copper and scrap tuyeres from the blast furnaces, is melted and poured from a ladle with a capacity for pouring four castings. Temperature of the metal has to be held within close limits. Experience has shown that where more than four tuyeres are poured from the same pot, the variation in temperature will cause the casting from the first and the last of the heat to leak under pressure.

Two openings in the large end of the casting are tapped and threaded for connection with the circulating water pipes. Two additional openings are formed for the double purpose of locating and anchoring the core properly, and of providing additional openings for the vent from the core. Later these extra openings are tapped and threaded for the reception of plugs that are screwed in tightly. The extra openings also facilitate removal of the sand forming the chamber core. The castings present an exceptionally clean, smooth skin, and with the exception of a little grinding require little time or labor in the cleaning and shipping room.

Approximately one-fourth of the floor area, at the opposite end from the pit furnaces and tuyere making station, is occupied by four large machines and ac-

(*Concluded on page* 236)

New Precision Built Roto Center Eliminates Chatter... Speeds Production!

Now You Can replace dead centers on lathe and grinder tailstocks, with this new Keene live Roto Center—to increase production—to eliminate all radial play and possibility of chatter! Low in cost, the Roto Center is a high capacity unit, featuring many innovations to speed and improve quality of work!

Matched roller bearings preloaded, are packed with high grade anti-friction grease at assembly. No attention is required for long periods. After assembly, runout is kept to absolute minimum—guaranteed less than .0002. Rear of center is tapped to receive standard hydraulic fitting. Chips, dust and cutting oil cannot reach bearings!

More and more peacetime "helps on the job" are returning to industry. One of these days, famous, flavorful Wrigley's Spearmint Gum will also be back to help you "on the job"—but only when we can assure Wrigley's Spearmint manufacture in *quantity* and *quality* for all. Today, we ask you to remember the famous Wrigley's Spearmint wrapper. Tomorrow, you may again enjoy Wrigley's Spearmint Gum quality and flavor while you are at work.

You can get complete information from Keene Electrical Machinery Co., 549 W. Washington Blvd. Chicago 6, Ill.

The Keene Roto Center

Remember this wrapper

Z-94

simple mechanism of Lectromelt FURNACES assures trouble-free service

IN addition to high efficiency features, high-production features, marked economy features, the Lectromelt Furnace is reassuringly SIMPLE IN MECHANISM.

These features of high desirability were developed first, and then with equal thoroughness and sound engineering, all mechanisms were simplified so that there is every assurance that a Lectromelt Furnace will operate in your plant, day after day, year after year, with uninterrupted regularity.

Quality of Lectromelt irons and steels is unsurpassable. Top Charging reduces the dead time of charging to a matter of minutes. Versatility permits production of all metals possible with any other melting method.

Lectromelt rated capacities in the top charge type range from 100 tons down to 250 pounds. Illustration is of size PT, 3 tons per hour Lectromelt being charged with a drop bottom charging bucket.

WRITE FOR LECTROMELT LITERATURE

PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH 30, PENNA.

Shelton Metallic Filler

★ QUICK DRYING

★ HARD SETTING

CASTING Surface Patching Cement

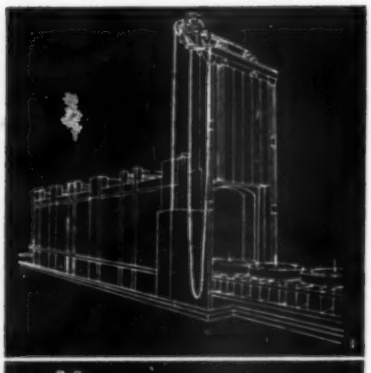
Foundrymen strive to make each casting perfect. If, however, surface imperfections occur, use the filler that dries faster, sets harder, takes file finish. 25 years a favorite in the foundry trade. Dark and light shades.

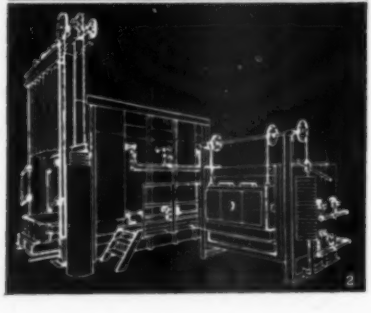
Shelton Metallic Filler is packed in cans of 1, 5, 10, 25 and 100 lbs. Write for sample.

Product of

AMERICAN CRUCIBLE COMPANY

SHELTON, CONN.





VULCAN FURNACES

. . . For Higher *Quality* Production, Economically

1—VULCAN Car Hearth Furnace for heat treating a variety of large steel parts, and for clean annealing steel strip in coils. Temperature range from 800°F. to 1800°F. May be oil or gas fired.

2—VULCAN Car Hearth and Box Type Furnaces, the former having capacity of twenty tons, with Box Type used for smaller charges. Temperature range, 650°F. to 2000°F.

VULCAN Furnaces are custom-built. Consultation with our engineers concerning your particular heating and heat treating requirements will incur no obligation. Wire, write or phone.

VULCAN CORPORATION

104 NORTH 17TH STREET, PHILADELPHIA 3, PA.

(*Concluded from page 234*)

companying miscellaneous equipment for producing castings by the centrifugal process in diameters from 3 to 47 in., and in lengths up to 300 in. In some instances, the casting is removed and passes through all the subsequent machining operations as a unit. In other instances, the long casting may be removed from the machine as a unit, and later cut into any desired number of sections during the machining operation. Similarly, a casting of any desired length up to 300 in. may be formed in a mold of the proper diameter by placing a stopper in the mold at the desired point.

Special cast iron mold flasks, properly balanced and provided with accurately machined bearing bands on the outside, are available for use on the machines. The flask or container is set up vertically in a pit and a machined metal pattern is lowered into the center. Sand is rammed in the comparatively narrow space between pattern and flask. The pattern is removed and the sand face of the mold is sprayed with blacking from an ingenious type spray gun. The mold is moved into a gas-fired oven adjacent to the pit in which it was rammed, and left there for several hours or until the sand lining is thoroughly dried. Then it is lifted out of the oven and laid down horizontally on the floor and then lifted again and lowered into position on the centrifugal casting machine.

Centrifugal Machines Belt Driven

The machines are of exceptionally strong and rigid construction, designed to prevent vibration while the mold is revolving at a speed ranging from 200 rpm on the large sizes to a speed of 400 rpm on the smallest size. All four machines are belt driven. Power for driving the smaller machine is transmitted from the motor through multiple V-belt. The power plant is set up in duplicate, one for actual operation, the other maintained as spare.

A combination pouring trough and spout, with the spout projecting into the open end of the mold, is set up at the outer end of the machine. The correct weight of metal for the desired casting is tapped into a ladle suspended from the crane. The mold is started spinning before the metal is poured into it, kept spinning until the metal has solidified and then gradually slowed down to a stop. To accelerate cooling of the casting, a fine water spray from a long gun is introduced through the open end of the mold after the pouring device has been removed. The large, heavy castings are removed by inserting bolts in holes drilled in the end.

Opens Sales Office

National Malleable & Steel Castings Co., Cleveland, has opened a southern sales and service office at Richmond, Va., in charge of William M. Blackmore, district sales manager, who has been associated with the development of the company's railroad products for many years.

Royal Flush ...or Bluff?

You have to see more to know!

GET ALL THE FACTS... AND YOU'LL CHOOSE PENOLYN CORE OIL!

1. **UNIFORMITY** — rigid laboratory control; no "settling out" in drums or storage tanks.

2. **CONCENTRATED FORM** — high sand to oil ratio; economical.

3. **NO OBNOXIOUS ODOR** — during mixing, baking or pouring.

4. **NO SEEPAGE** — will not settle or drain to the bottom of sand mix or green, unbaked cores; baked cores will not stick to plate.

5. **NO CRUSTING OF GREEN MIX** — air dries slowly; green mix can be stored as long as 24 hours and still be usable.

6. **CLEAN WORKING** — eliminates frequent cleaning of core boxes; sharp draws.

7. **WIDE TEMPERATURE BAKING RANGE** — small and large cores can be baked at the same time; no burnt cores.

8. **POLYMERIZED FORMULATION** — maximum strength right through to center of baked core; dryer and plate side of equal hardness as exposed surfaces; no adherence.

9. **MINIMUM GAS** — less venting; fewer blows; lower casting losses.

10. **AMPLE COLLAPSIBILITY** — no hardened lumps to dig out; disintegrates while allowing metal to solidify and cool; fewer cracked castings.

PITTSBURGH, PA.

Penola

Reg. U.S. Pat. Off.

NEW YORK DETROIT
CHICAGO ST. LOUIS

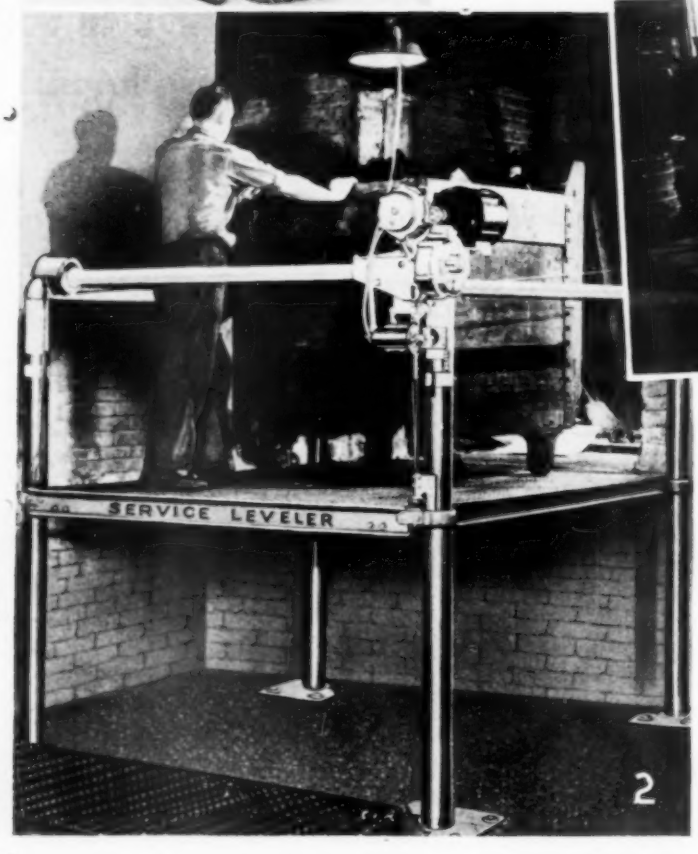
Our engineers are always ready to serve you. Write us about your particular core oil problem.

NEW EQUIPMENT and SUPPLIES

(1)—Sand Conditioner: Royer Foundry & Machine Co., Kingstown, Pa., has developed a portable gas engine-driven unit for conditioning sand on the way from storage. The unit is available in three sizes: Junior *G*, 1 to 3 cu yds per hour capacity (shown here); *H*, 3 to 5 cu yds; and *O* with hourly capacity 3 to 8 cu yds. It is stated that these ruggedly built self-contained units can be moved readily and are particularly designed for yard service where electrical connection is lacking. Likewise, they may be used indoors to provide such essentials for thorough sand preparation, as removing refuse, breaking lumps, blending and mixing, distributing moisture, and aerating.

1

(2)—Service Leveler: Service Caster & Truck Division, Domestic Industries Inc., Albion, Mich., and Somerville, Mass., announce a lifting device in which the basic safety feature is the hoisting and control mechanism. Fully enclosed power unit and motor are positive under all operating conditions. A free wheel brake controls the lowering of the platform at a steady predetermined speed. A centrifugal governor always is present as an emergency safety brake. Control of the platform travel to full height or to floor level is governed by an automatic traveling nut and flat cam mechanism that stops the motor automatically at top height or floor level. Stops at intermediate heights are controlled manually by the switch.



2

(3)—Roto-Cast: Foundry Equipment Inc., Coldwater, Mich., announces a piece of foundry mechanism designed to eliminate the time and effort required in carrying heavy molds. Mechanical features are simple. The I-beam base welded to the center column rests on the floor, and the machine revolves around the center column. The molder turns around to put down mold, steps on trip ratchet release and a spring arrangement revolves the device to position for receiving next mold. The same arrangement facilitates pouring, and shaking out. Flasks and weights remain on the revolving table. Release of the ratchet makes the device free wheeling. It is claimed the device is adaptable for small or large foundries. It is available in three sizes, 10, 12 and 14 ft in diameter.

(4)—Molding Machine: Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O., has placed on the market a jolt, rockover, pattern draw molding machine presenting several new and improved features. These include power-operated clamps; roller discharge mechanism for operation straight out or at right angles; ample jolt piston length, and large contact area between the jolt table and the rockover plate. The roll-

(*Continued on page* 240)

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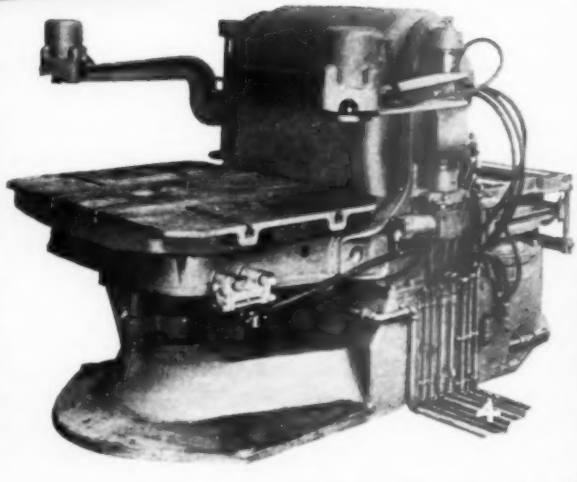
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No. 12 of a Series: "Looking at the FIVE ESSENTIAL THINGS you never see in ELECTRODES!"

Extruding an electric-furnace electrode. Sixty years of experience, guided by continuing research, enables National Carbon Company to make electrodes of unmatched quality.
MATCHING STRIDES WITH STEELMAKERS

Under the stimulus of war, the steel industry has developed new techniques to attain new highs in efficiency. The industry is thus better equipped to meet the challenge of the days to come.

Matching strides with the steelmakers, National Carbon Company, Inc. . . . through continuing research . . . also successfully rose to meet this war crisis. Carbon and graphite electrodes performed as never before.

And now in the days to come, continuing research—one of the "five essential things you never see" in electrode-manufacture*—will continue to help us to parallel the progress of steel by turning out ever stronger, more uniform electrodes.

• • •

*These "five essential things you never see" in electrodes are: selection of raw materials, manufacturing experience, manufacturing control, continuing research, and customer service. They are a part of every "National" and "Acheson" electrode. We shall be glad to explain in detail how they can be of distinct advantage to you.

NATIONAL CARBON

ACHESON GRAPHITE

The words "National" and "Acheson" and the "National" and "Acheson" Seals are registered trade-marks of National Carbon Company, Inc.

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Unit of Union Carbide and Carbon Corporation
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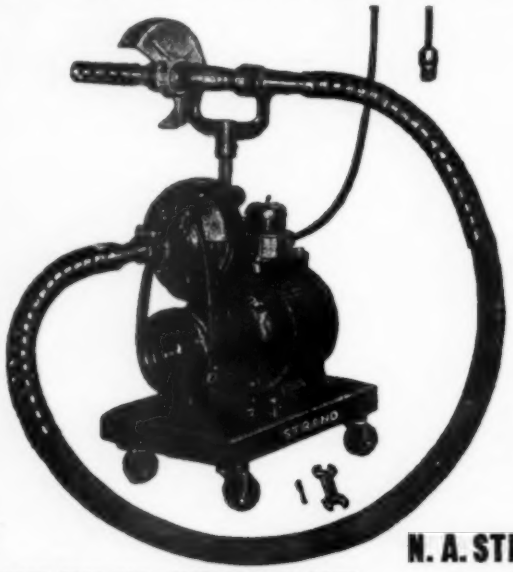
GENERAL OFFICES: 30 East 42nd Street, New York 17, N.Y.
DIVISION SALES OFFICES: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
In Canada: Canadian National Carbon Company Limited, Toronto 4, Canada

ESTABLISHED 1905

Strand
FLEXIBLE SHAFTS

FORTIETH YEAR 1945

HIGH QUALITY
FLEXIBLE SHAFT MACHINES
ONE HUNDRED TWENTY-FIVE TYPES AND SIZES, ⅛ TO 3 H. P.



HORIZONTAL AND VERTICAL
THREE SPEEDS OR SINGLE SPEED
MORE THAN THREE HUNDRED ATTACHMENTS.

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THE LARGEST LINE IN THE WORLD

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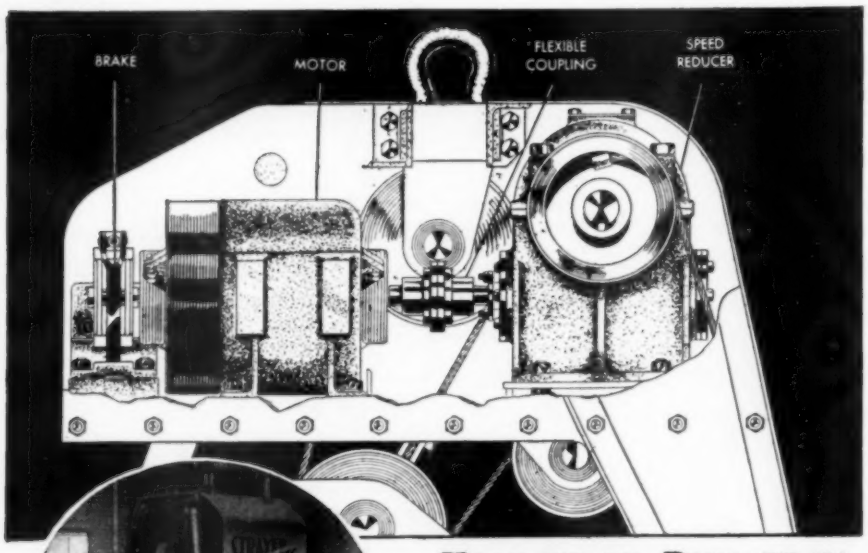

HOOK 'ER ON—PLUG 'ER IN

ABOVE YOU SEE WHY the Erie Electric Bucket works in its own headroom controlled from the crane cab. This sturdily constructed bucket needs only to be hooked over the crane hook and power line plugged in. The man in the cab controls the opening of the bucket from cracking the lips to any degree of opening or closing. The extra in-built weight permits easy penetration. *Write for complete particulars.*

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ERIE BUCKETS
THE MOST COMPLETE LINE BUILT

» ALSO AGGREMETERS
ELECTRIC OVERHEAD CRANES
PORTABLE CONCRETE PLANTS

(*Continued from page 238*)

over mechanism is enclosed in a cast iron housing. The double piston draw mechanism is complete enclosed. Leveling mechanism is of the air lock type. The mold is completed through manipulation of the operating valves at one convenient location. Jolt stroke length is adjustable. The rockover platform is slotted for convenience in bolting patterns. Large double guide pins guide the platen to the rockover frame. A simplified positive acting lock holds the rockover platen in accurate alignment with the rockover frame during the draw operation.

Buffing, Polishing: Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4, O., announces the latest addition to a line of infinitely variable speed buffing and polishing machines. Available in 5 and 7½ hp sizes, the machine is arranged with two separate spindles; two motors; two magnetic starters, two start-stop push button stations; two hand

brakes, each with coincidental switch; and two hand wheel indicator speed controls. Speed regulation between 1500 and 3000 rpm is quickly accomplished by turning hand wheel. Two men can work independently of each other. Convenient spindle speed change permits polishing, coloring, buffing, etc. From the side of the base to the inside of the wheel is 11 in., but may be ordered with distances of 7½ or 17 in. Standard length of spindle is 78 in., height to center of spindle 38 in.

Ventilating Hose: American Ventilating Hose Co., 15 Park Row, New York 7, N. Y., has developed a new type ventilating hose suitable for use with portable manhole and tank ventilators, portable air conditioning and heating and cooling units. It is reinforced by rings spaced 2 to 5 in. apart, varying according to hose diameter. A neoprene base compound covers both inside and outside surfaces. Available in sizes from 5 to 24 in. in diameter, it can be compressed for transportation into one-sixth its normal size.

Gearless Pump: Eco Engineering Co., 12 New York Ave., Newark 1, N. J., is introducing an improved gearless pump for circulating water, light oil or other liquids. Special bearings require only water lubrication. All metal is of bronze. The removable impeller is

(*Concluded on page 242*)

Control Radiography

This is a binocular casing designed to withstand 9 lbs. to the sq. in. X-ray reveals unsatisfactory casting structurally porous. Radiograph suggests certain changes in vents and gates.

Radiograph of binocular casing, cast from die which included changes recommended by radiograph (a). X-ray provided rapid, precise indications—eliminating lengthy process of "developing".

PAYING DIVIDENDS in Evaluation of Optimum Die Temperatures

Satisfactory production of die castings depends greatly upon the operating temperature of the die. Castings made in a cold die are usually more porous than those made at higher temperatures. An accurate record of the internal casting structure may be made by radiography. Castings selected and radiographed at various die temperatures, rapidly determine the minimum die temperature at which sound castings can be produced.

When the most satisfactory conditions are obtained and production of castings initiated, it is not safe to assume that ideal castings will be produced at all times during this run. Instruments, die setups, et cetera, may vary—resulting in changes of metal temperatures. Radiographs of production samples, selected at intervals, will check the consistency and quality of the castings produced.

An x-ray "spot-checking" will insure against the production of large quantities of castings which may have to be scrapped. J-02059

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

INDUSTRIAL X-RAY

Electronics at Work

Alnor
PYRO-LANCE

built to stand up in foundry service

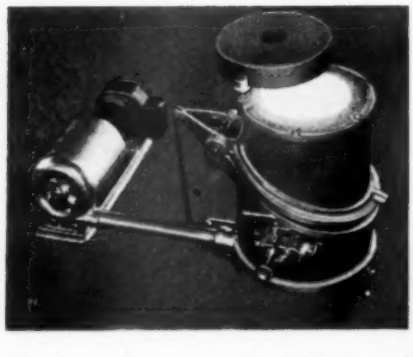
This portable pyrometer is built with a rugged shock-resisting movement and an enclosed extension thermocouple—a unit especially designed for reliable foundry service. It gives you the quick, accurate temperature readings so important to efficient, economical production of sound castings.

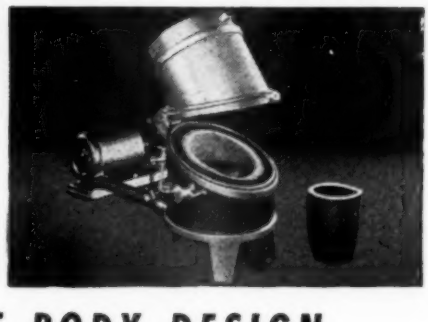
The Alnor Pyro-Lance is especially suited to use with molten brass, bronze, copper, aluminum bronze, magnesium alloys, and similar metals where temperatures are not over 2300 degrees F. The special enclosed thermocouple takes true readings below the surface, unaffected by dross or surface conditions. Standard range is 0-2500 F.

Write for bulletins.

ILLINOIS TESTING LABORATORIES, INC.
420 NORTH LA SALLE STREET • CHICAGO 10, ILLINOIS

CUT NON-FERROUS FOUNDRY COSTS
WITH THE
ILER
CRUCIBLE DRAW FURNACE





Faster, easier, lower cost handling, with substantially more melts per day is an established fact with the Iler Crucible Draw Furnace. Pouring is direct; no tongs nor overhead handling equipment is required, no over-heating nor transfer of metals is necessary. No pit is needed as the furnace is mounted on legs and stands on the floor.

EXCLUSIVE SPLIT BODY DESIGN

Provides quick removal and replacement of crucibles; eliminates the expense of extra crucibles. When open, heat is trapped in upper section of furnace, reducing reheating time and cutting fuel costs. An automatic air lift opens and closes furnace at the touch of a valve, speeding up operations and doing away with heavy lifting.

The Iler Crucible Draw Furnace is sturdy in construction and extremely low in first cost. Burner for either gas or oil is optional. Available immediately in sizes 50 - 70 - 90 - 125 to accommodate crucibles of corresponding number. Send today for full information and prices.

FEN MACHINE CO.
1350 Babbit Road, Cleveland, O.

ILER CRUCIBLE DRAW FURNACES

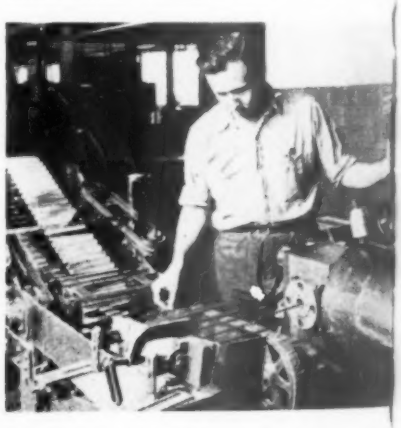
(*Concluded from page 240*)

of tough resilient material composed of several layers of laminated sections vulcanized together. Opening the face plate allows quick removal of any obstructing material.

Steel Stools: Lyon Metal Products Inc., Aurora, Ill., is marketing steel stools available in five heights and 40 styles designed from a physiological standpoint to meet every posture need. Interesting features include nonbreakable con-

struction; unusually large comfortable 14-in. ...e seat, with rounded corners; strong channel brace which provides a comfortable foot rest at uniform distance below the seat; steel glide feet and long life pressed wood seat applied over steel.

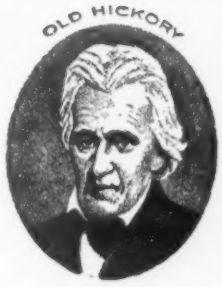
Welding Electrode: A new welding electrode, having the trade name Ni-Rod, for making machinable welds in cast iron has been introduced by the International Nickel Co. Inc., New



York 5. Besides this electrode, which is shown coming from the extrusion press in the illustration, the company offers a nickel chromium electrode for welding nickel clad steel, as well as six others designed for welding nonferrous metals and the various clad steels.

Fire Extinguisher: America... La-France-Foamite Corp., Elmira, N. Y., announces a 40-gal chemical extinguisher which is said to quench hot oil fires without danger of reflash. It delivers over 450 gal of foam in 3 minutes.

May all your Clouds have a Silvery Lining during 1946



From Andrew Jackson's farewell address to his soldiers: "*Farewell, fellow-soldiers. The expression of your general's thanks is 'eeble, but the gratitude of a country of freemen is yours—yours the applause o an admiring world.*"

·HIGH SILICON IRON·

JISCO

THE JACKSON IRON & STEEL *Company*

JACKSON, OHIO.

QUALITY • DEPENDABILITY
UNIFORMITY • PRODUCTION
...Vital in the Casting of Metals

FOUNDRY SPECIALISTS

A highly skilled staff of Foundrymen . . Engineers . . Metallurgists

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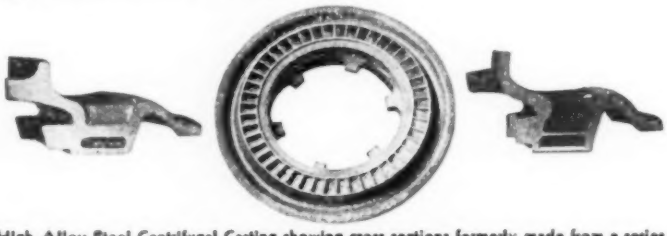
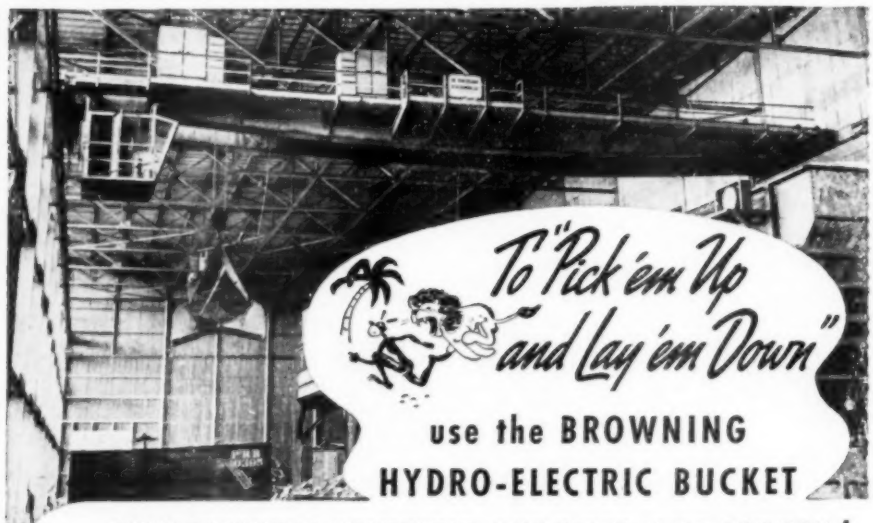
- Mechanization and Modernization
- Scientific Foundry Management
- Manufacture of Centrifugal Castings



High Alloy Steel Centrifugal Casting showing cross sections formerly made from a series of forgings. Thin section 1/16-inch—100 per cent X-Ray Inspection.

W. G. REICHERT ENGINEERING CO.
1060 Broad Street —*Foundry Specialists*— Newark 2, N. J.



. . NEW PATENTED PRINCIPLE, BUT TRIED AND PROVEN !

Handles many important jobs faster, better, for less. A.C. or D.C. current. Electrically driven hydraulic pump connected to cylinder and ram, in turn connected to bucket lips by trunnion; movement of ram opens and closes bucket. When bucket closes, pressure reaches maximum and oil passes through relief valve; no overloading of motor, no damage to bucket. No sheaves, cables, chains or other trouble-causing "gadgets"; closing mechanism runs in oil. Bucket opens by gravity; no power waste in closing. No headroom lost for closing. Simply hook on and plug in; 10 minutes to hook or unhook. Write today for a copy of our new, well illustrated BULLETIN.

VICTOR R. BROWNING & COMPANY, Inc.
WILLOUGHBY (CLEVELAND), OHIO
Designers and Builders of All Types and Capacities of Electric Overhead Traveling Cranes and Hoists and Electric Revolving Cranes

BOTTLENECKS OF RECONVERSION

(*Continued from page* 97)

interest; that is, the right of the nation should not be interfered with by individuals or groups. At that time I spoke on the subject of strikes. Strikes, of course, constitute a bottleneck, especially when they occur in industries, the closing of which results in shutdowns in other industries, in dissipation of jobs.

"But the bottleneck I am speaking of today is outlined in the letter I have just read. It is one that government can iron out, if it will get underway, if government will assist in siphoning men into this (gray iron foundry) industry instead of interfering with the industry, as was done a few years ago. The general average of pay in this industry throughout the nation is $1.02 an hour. But the big thing about it is that it is calling for help, not so much for itself, as for the general welfare of the nation. It will produce wealth and 3 million additional jobs."

A second bottleneck is the bottleneck of government. As you so well know, men in government have often been a hindrance to the nation's business during peacetime for the past decade, during the war years, and now during the reconversion period. Just why is this?

1. Government has too many square pegs in round holes, too many misfits in high places who haven't been weeded out by efficient administrators. It has too many petty dictators, too many extravagant wastrels who squander the resources of our people.

2. Government simply has too many people and they are stepping over each others' feet. Right now, the federal government has more than three million civilian employees! The financial costs of their employment are staggering, particularly when you consider the $300 billion of national indebtedness.

3. Government administrators have adopted policies which are inimical and harmful to free American enterprise. They have failed to provide incentive to produce. They have penalized our businessmen instead of encouraging them to maximum production. The OPA, in particular, has adopted a reconversion pricing policy which in many instances will not even allow business to turn a profit at all.

4. There are too many snoopers in government. A business friend of mine said he had ten in one day. The government's habit of requiring a multitude of reports and questionnaires, its habit of sending out incomprehensible instructions and a thousand other nuisance pieces of correspondence and orders not only plagues private enterprise but sets it far back in its work.

5. The government is handling functions now which should properly be handled by the state and local governments. Our states and municipalities are in a

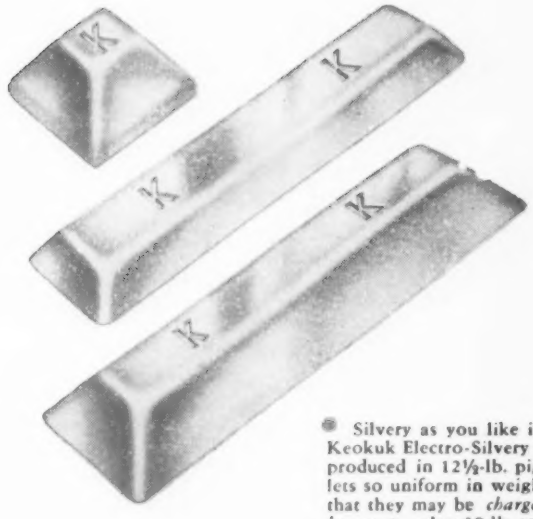
(*Concluded on page* 246)

ADD THE *Best!*

KEOKUK ELECTRO-Silvery

● Silvery produced electrically *is* the best! Keokuk Electro-Silvery, both standard and alloy, manufactured under complete and constant analysis, assure highest, uniform quality. When added to your metal, they eliminate speculation . . . you *know* the results in advance.

● Keokuk production and distribution embody all the advantages of modern and efficient methods. Our steady progress and metallurgical developments in the past thirty years establish our position as specialists. Discover now the many advantages of Keokuk Electro-Silvery. Write today . . . a Keokuk metallurgist will call at your convenience.



● Silvery as you like it! Keokuk Electro-Silvery is produced in 12½-lb. pigs so uniform in weight that they may be *charged by count*...also 30-lb. and 60-lb. pigs. All can be handled by magnet.

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FOR THIRTY YEARS . . . ELECTRO-SILVERY AND OTHER FERRO-ALLOYS

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To stock the following CEMCO Aluminum Alloys for immediate shipment:

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Notch Bars
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MEANS FUTURE ECONOMY!

The modernity of design and layout of your plant or expansion project will definitely be a determining factor in the success of your enterprise. We have devoted nearly a quarter-century to solving the many and varied problems associated with design, construction and operation of modern foundries. Our highly trained staff of engineers is always at your service and ready to assist you with any design or construction problems you may encounter. Write or telephone us today!

FOUNDRY ENGINEERS SINCE 1919

A. A. WICKLAND & CO.
ENGINEERING BUILDING • CHICAGO (6)
TELEPHONE ANDOVER 5922

(*Concluded from page 244*)

far better position today financially than the federal government. We should turn back to them the functions which were taken over by Washington, first during the depression emergency, and then during the war emergency.

A third bottleneck is the matter of strikes. I have already proposed on the floor of the Senate a ten-point plan which would meet head-on this strike situation. It is obvious that the strike conditions in this country are going to get worse before they get better.

I have proposed the following steps:

1. Re-evaluate the entire Wagner Act. That act obviously filled a certain need in bygone years, but it is hopelessly obsolete and even harmful today to the best interests of the American people. It is a segmental act, designed for only one segment of our population. It must be revised in the interest of the public welfare.

2. Immediately enact legislation to have compulsory arbitration protect the public interest. Compulsory arbitration is now with us in some labor-management contracts and between business concerns, and has been very effective. It results in protecting the public interest. There may be some differences of opinion as to imposing compulsory arbitration upon all disputes—big and small. There can be none, because the public interest is so overwhelming in disputes covering such matters as the food and fuel supplies for whole communities, transportation, communications, public utilities, and the like. The public interest and safety require it.

3. Establish the policy of having representatives of the public participate in every labor-management conference.

4. Enact any necessary clarifications of the draft law in order to insure full protection of the re-employment rights of veterans.

5. Insure full protection by law enforcement officers to all veterans and others who want to take up jobs vacated by strikers.

6. Establish the legal responsibility of unions for all violations of contract in the form of wildcat strikes, etc.

7. Require the full and accurate reporting of union finances and officers in the same manner as we require such reports from corporations.

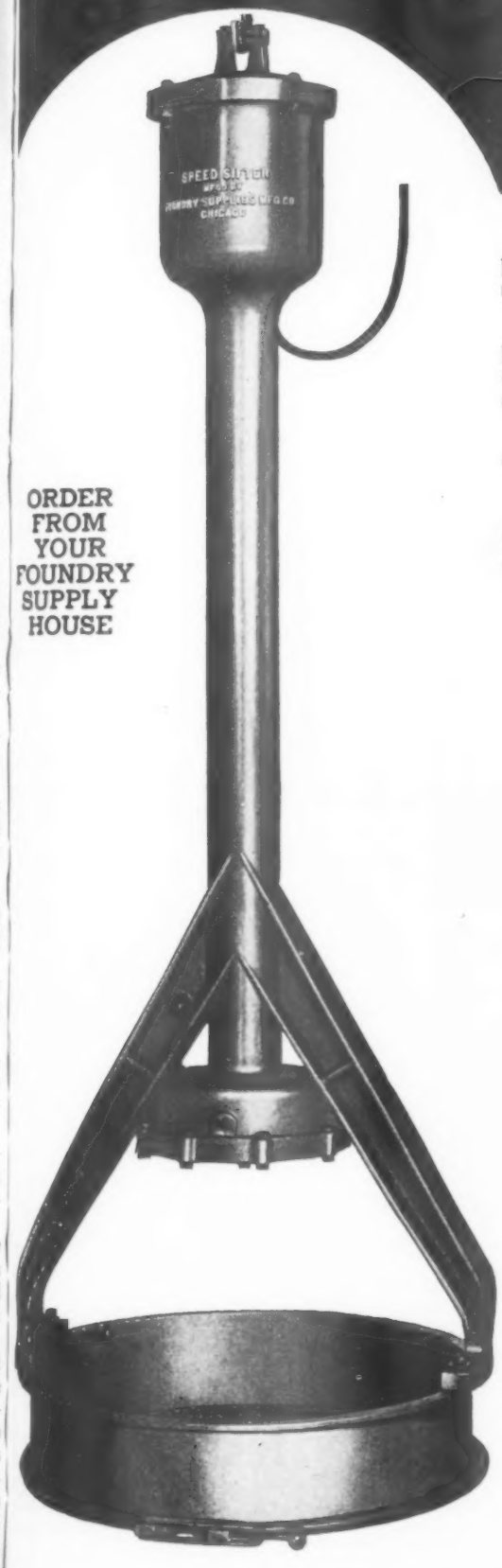
8. Establish the labor-management-public conferences in Washington on a continuing basis rather than on a one-time basis.

9. Request of labor leaders that they themselves come forth with legislation that will end the menace of strikes and provide ways and means of collaboration between management and labor.

10. Amend the Sherman Anti-Trust Act to make labor organizations whose members are engaged in interstate commerce subject to that act. Prohibit them from engaging in unreasonable restraints of trade, for example, those restraints designed to compel the hiring of useless labor to prevent the use of cheaper material, improved equipment or more efficient methods, etc.

Increase Production with
ROTOPLANE Speed Sifters

"Hard-to-Please" Foundries Standardize on Rotoplane!



ORDER FROM YOUR FOUNDRY SUPPLY HOUSE

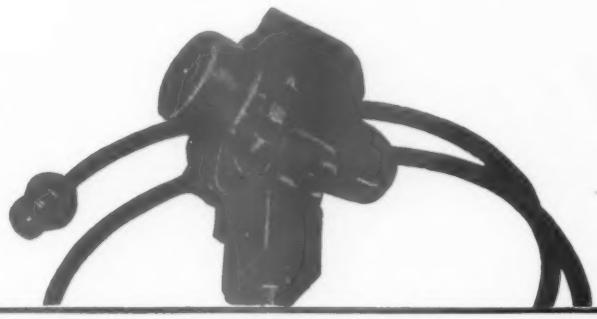
Try ROTOPLANE in your plant. You, too, will find it increases production, does *all* your sifting more quickly and economically. One size and type for all sifting jobs.

ROTOPLANE is built for long, dependable service. Strong, one-piece frame gives remarkably effective vibration. Smooth, free, rotary action. All mechanism completely enclosed and dustproof. Weight approx. 90 lbs., 62 in. high overall.

Steel-mounted sieves instantly interchangeable. No jagged screen edges, no storage problem. 20 in. diameter clear sifting area.

TEN DAYS FREE TRIAL.

$175.00 f.o.b. Chicago — complete with cable, safety ground wire, one sieve (2-4 mesh). Standard ⅓ h.p. motor, 115-230 volts 60 cycle single phase.
Prices with other motors quoted on request.



ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work..... $10.00	No. 5—Heavy match plate, tub, bench $17.00
No. 2—Medium match plate 13.00	No. 9—Machine and heavier 24.00

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street — Chicago, Illinois

CABLE ADDRESS: "ROTOPLANE CHICAGO"

1.—COPE is entirely made of TAMASTONE.

2.—DRAG is of TAMASTONE with a metal gate.

Note irregular shape of manganese casting.

3.—14" x 24" SLIP FLASK is designed to conform with extremely irregular parting line and manganese casting. Cope 11" high with 6" offset and 4" drag.

TAMASTONE

makes possible

500% INCREASE

at Hunter Foundry Co., Chicago

With original equipment, gated pattern and hard match only 10 to 12 molds per day were possible. Through the use of TAMASTONE Pattern Compound (100 lbs.) the job is converted to separate cope (A) and drag (B) patterns and production is now 60 molds per day. This new method enables the foundry to draw pattern from the sand as offset parting, eliminating the amount of sand to be lifted in the cope. Equipment is gated for pouring manganese.

Savings from 300 to 500% are also possible in match plate production! Write for literature today!

No. 90 IRON OXIDE

Used in Grey Iron and Steel Foundries. Add to regular core sand mix. Prevents core burning, veining, penetration. Prevents core sand failure. Improves castings, reduces cleaning cost! Inexpensive!

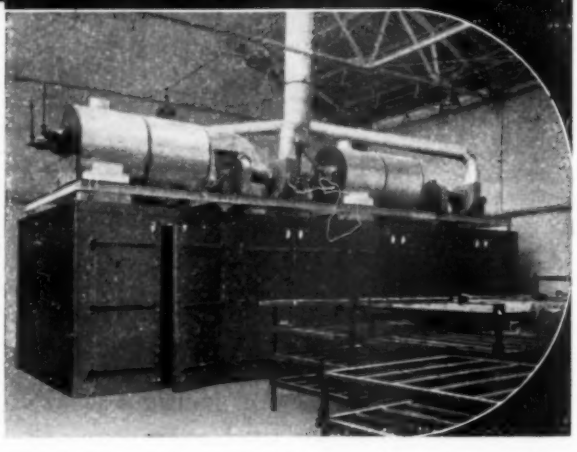
Write for sample!

TAMMS SILICA CO.

228 N. La Salle St. • Chicago 1, Illinois

New FOUNDRY OVENS

REMODELING AND REPAIRS?



Reconversion to normal production will entail many changes.

In foundries it may require the repair of overworked ovens—the redesign of outdated equipment—the rearrangement of core and mold ovens—or their removal to new locations.

Lanly is in a position to render expert assistance in any service pertaining to ovens or furnaces for industrial uses.

Write for illustrated catalogs and consult us regarding any need that may arise.

THE LANLY CO.

OVENS FOR INDUSTRY

HEATED BY GAS, OIL, ELECTRICITY OR STEAM

750 PROSPECT AVENUE • CLEVELAND, OHIO

OPINIONS ON GRAPHITIZATION

(*Continued from page* 103)

ordinary practice appear to exert a sort of "magnetic attraction" on the adjacent carbon in the combined state, tending to cause it to divorce itself from combination with the iron and attach itself to the free carbon particles.

This property of free carbon can be appreciated by examining the structure, at various stages of graphitization, in the conversion of white iron to malleable iron.

A good example is a gray iron containing some type D graphite in dendritic pattern. The austenite dendrites have become ferrite instead of pearlite even when of considerable width while in another portion of the same specimen, with larger flake graphite, pearlite will be found in contact with some of the graphite flakes. This does not mean that the flake graphite does not also have this property, but that it has it to a lesser degree. A little more time just below A, would have resulted in the carbon from the pearlite precipitating on the flakes. It is possible that the flake form being produced from the liquid may have a more dense and less reactive surface or it may be coated with a thin film of some segregated material that interferes, whereas the carbon produced from the solid state has a more active character in this respect.

Solidification Started at Many Points

This reference to graphitization from the solid state does not necessarily mean that the eutectic solidified in mass and then graphitized. What is meant is that the mass of eutectic in this area has cooled below solidification temperature before any solidification has started and all is trying to solidify at once. Hence, solidification is starting at many points very close together at the same time and the nuclei formed by immediate graphitization at these points have very little liquid to feed from. The result is a large percentage of this type of graphite has formed from the solid, while the larger flakes, except for the original nuclei, form from the liquid.

Another excellent example is a steel specimen repeatedly put through a malleablizing cycle packed in carburizing compound, as shown in Fig. 2. As can be observed in the micrographs, the composition was such that the carbide was relatively stable and the saturated austenite simply rejected, in massive form, the additional carbide being produced by the carburizing action. In the course of time some small active carbon nodules appeared and grew rapidly. Surrounding these carbon nodules are ferrite areas, while beyond the range of influence of these nodules the pearlite has apparently made no progress toward decomposition. It is not clear whether the original nuclei

(*Continued on page* 250)

OUT GOES DUST

DOWN GO COSTS

● As Industry swings into full peacetime production, competition is sharpened to a super-keen edge. Costs must be examined critically, intensively, as never before.

In the over-all cost set up, dust control merits primary consideration. By providing clean plant air, efficient dust control safeguards the health of workers, speeds and improves the quality of production, protects valuable machinery and equipment against overly rapid deterioration . . . cuts costs.

But it must be efficient dust control, planned on sound engineering principles and geared to your particular plant. It must incorporate the right dust-collection units, selected from among the best makes available, as required by the materials used in your product and your particular manufacturing or processing method. It must be designed, fabricated, and erected so as to insure maximum efficiency without interference with factory operations.

This is the "custom built" dust or fume control which Kirk & Blum "Air Engineers" have installed in leading industrial plants throughout the nation, and are prepared to provide for your plant, whether as a complete new installation or an improvement of your present equipment.

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Centrifugal Casting News

Vol. 1 — CENTRI-MECO of KALAMAZOO — Dec., '45

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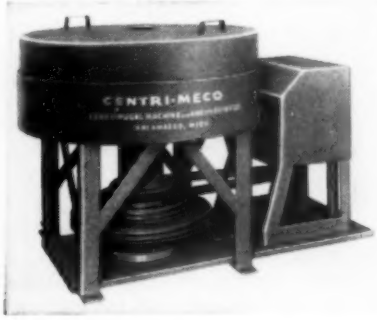

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(*Continued from page* 248)

in this case were carbon or something else. If carbon they were probably due to segregations of other materials lowering the stability of the carbide at these spots. Whatever the original source of the nuclei they naturally behave as carbon nodules once some carbon has precipitated on them.

In the case of the gray iron the original nuclei were probably carbon, as the carbide in soft gray iron is very unstable. Inoculation of harder irons with graphitizers also produces carbon nuclei.

A carbon particle normally having this "magnetic" property to a marked degree may, under certain conditions, lose it entirely[1].

This suggests the question of the rates of travel of "carbon" in either gamma or alpha iron. Whatever these inherent rates might be, free of outside influence they are, in so far as graphitization in commercial practice is concerned, entirely dependent on the graphitizing influences present, that is the degree of instability of the carbide as influenced by composition and all other factors including the condition of the carbon particles present. Naturally, if conditions are such as to inhibit graphitization, or, in the case of gamma iron, to interfere with the solution of the eutectic carbide, there is no urge to travel widely. If conditions are such as to promote graphitization the urge to travel is great because of the differential in concentration produced by graphitization.

Travel in Gamma Iron Reduced

For example: Assume a white iron casting with definite rates of travel for the "carbon" in gamma and alpha iron. If a small amount of an element whose stabilizing behavior is more pronounced at high temperatures (gamma iron) be added the apparent rate of travel in gamma iron is reduced while that in alpha iron is not materially affected. The converse would occur if the added element was one whose stabilizing influence was principally effective on the eutectoid carbide.

Any ferrous melt, regardless of how far to the left of the eutectic, made from charges containing some graphitized material or some high silicon material or perhaps any other element with strong graphitizing properties will result in minute segregations within the melt. These minute areas will have much higher concentrations of carbon or silicon or both, and while the melt as a whole may have a composition wherein the carbides should be highly persistent, it has many minute spots within which the composition is much different and, as a result, the carbide much less persistent. Hence carbon nuclei are formed at these points because of the lower stability, and they in turn help promote the decomposition of the remaining carbide. It is not meant that the carbon nuclei necessarily remain as such indefinitely in the melt. As the charge melts and increases in temperature the carbon combines with the iron and goes into solution as carbide.

(*Continued on page* 252)

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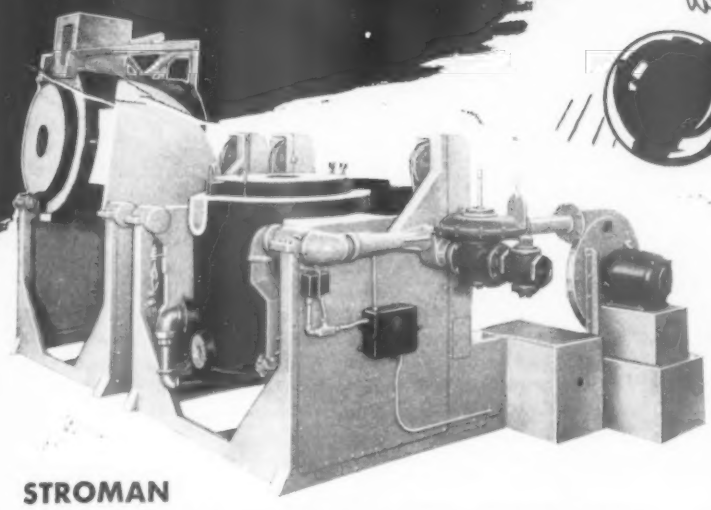

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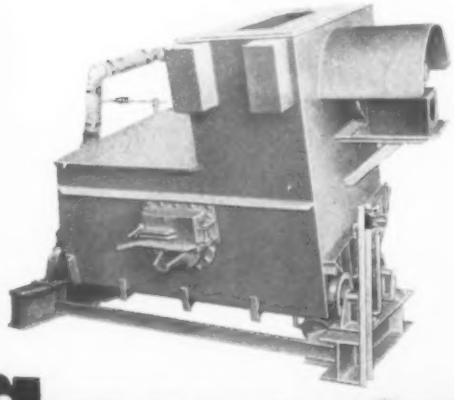

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(*Continued from page 250*)

With sufficient superheat and time for diffusion actual carbon nuclei disappear but there remains these minute spots that may be highly hypereutectic in the softer irons, and while the concentration is very much lower in the harder irons and steels, these spots remain as points of lower carbide stability—points of "potential nuclei."

As the melt increases in temperature any physical agitation that may occur tends to disperse and reduce this condition and along with diffusion soon results in a uniform mix as far as chemical samples are concerned, but within each volume that constitutes a chemical sample there exists this lack of homogeneity on a microscopic scale. Diffusion would probably eliminate it in time, but time is required and, of course, higher temperatures aid diffusion.

This process is very clearly seen in the preparation of a white iron melt for malleable cast iron. After the charge is melted and well stirred a test plug will be heavily mottled. Other plugs cast from time to time will show less and less mottle. With sufficient temperature and time, diffusion will have reduced the concentration of these minute segregations to the point where the test plug will be free of mottles. Even at this point diffusion has not completely eliminated these segregations but simply has reduced the graphitizing concentrations within them to the point where noticeable graphitization does not occur in this specimen at this cooling rate.

It is not just a question of whether the carbon "dissolves" in the iron or persists in the form of carbon nuclei. The carbon may disappear as nuclei under proper conditions for diffusion (time and temperature) and nuclei no longer exist as such but there still remains a condition of "potential nuclei" in the sense that these spots are of such composition as to render the carbide less stable here than in other parts of the metal, and it is probably these "potential nuclei" which play a large part in initiating secondary graphitization in white iron and steel.

Size of graphite flakes in a gray iron specimen is determined by the number of nuclei present and the time at which they are present with respect to the progress of solidification. The number of nuclei present at a given time is dependent not only on the nucleating ability of the material, but also on the rate of cooling through the solidification period and the degree of stability of the carbides.

The potential nuclei do not all become actual nuclei at the same temperature because of differences in concentration within the different potential nuclei. Considering an iron of great nucleating ability: If cooling is fast enough many nuclei will appear at near enough the same time to produce a fine flake, but if cooling is slow the first nuclei formed will lower the concentration of carbon in the neighboring metal thus preventing formation of additional nuclei in these areas, and the result is a large flake structure.

Effect of superheating is first to reduce the concentration of these minute segregations through diffusion which is accelerated by the higher temperatures. However, many other reactions, such as the reduction of silicon dioxide, are also accelerated by the higher temperatures and eventually the influence of these other reactions may more than offset the effects of diffusion on the original minute segregations.

An iron-carbon alloy at a given temperature may be free of actual carbon nuclei due to greater solubility of carbide at higher temperatures but still retain potential nuclei in the form hypereutectic composition which change back to actual carbon nuclei as the temperature is lowered. This is the cause of the controversies that sometimes arise as to whether more chill will occur on a casting poured hot or one poured cold. If the nucleating conditions are the same for both pouring temperatures the specimen poured colder will have more chill. If the higher temperature was such as to convert an appreciable number of the actual nuclei to potential nuclei of such concentration that they will revert to actual nuclei as the temperature lowers, then the specimen poured at the lower temperatures will have the lesser chill.

Inoculating gray irons with graphitizers sets the same mechanism in motion. Usually a short time is required for dispersion to reach peak graphitizing influence, then as diffusion occurs the graphitizing effect is gradually lost.

Elsea and Lorig[2] produced nuclei in white iron by a low temperature pre-anneal heat treatment of iron containing 0.6 to 2.5 per cent cu.

Small amounts of aluminum in connection with low temperature pre-anneal heat treatments are very effective[3]. In some cases amounts as small as 0.003 per cent Al with proper heat treatment will produce abundant nuclei. Small amounts of some other elements also behave in this manner to some extent.

The mechanism in these cases is probably the precipitation of these elements or compounds of them from solid solution during the low temperature treatment. These particles then either act as nuclei themselves, encouraging the precipitation of carbon, or by their minutely localized concentration render the carbide less stable at these points, thereby inaugurating carbon nuclei.

White irons quenched in oil or water from above 1400 F contain many nuclei and, in general, the more severe the quench the more nuclei. In this case it is not clear what the nuclei are, but there is the possibility that they are due to severe stresses, perhaps resulting in submicroscopic ruptures. Since graphitization involves expansion it seems reasonable to assume this condition could well result in inaugurating graphitization.

Incidentally, this treatment, especially if more severe, results in many cracks, frequently internal cracks of large magnitude having no connection to the sur-

(*Continued on page 254*)

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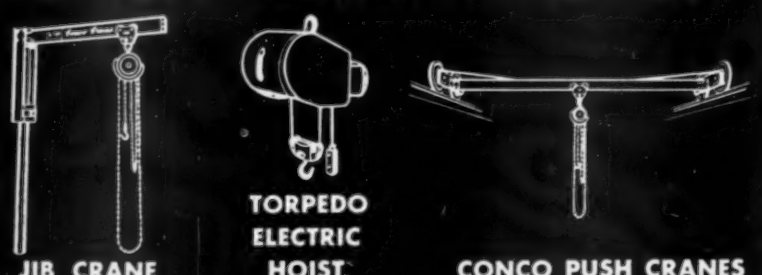

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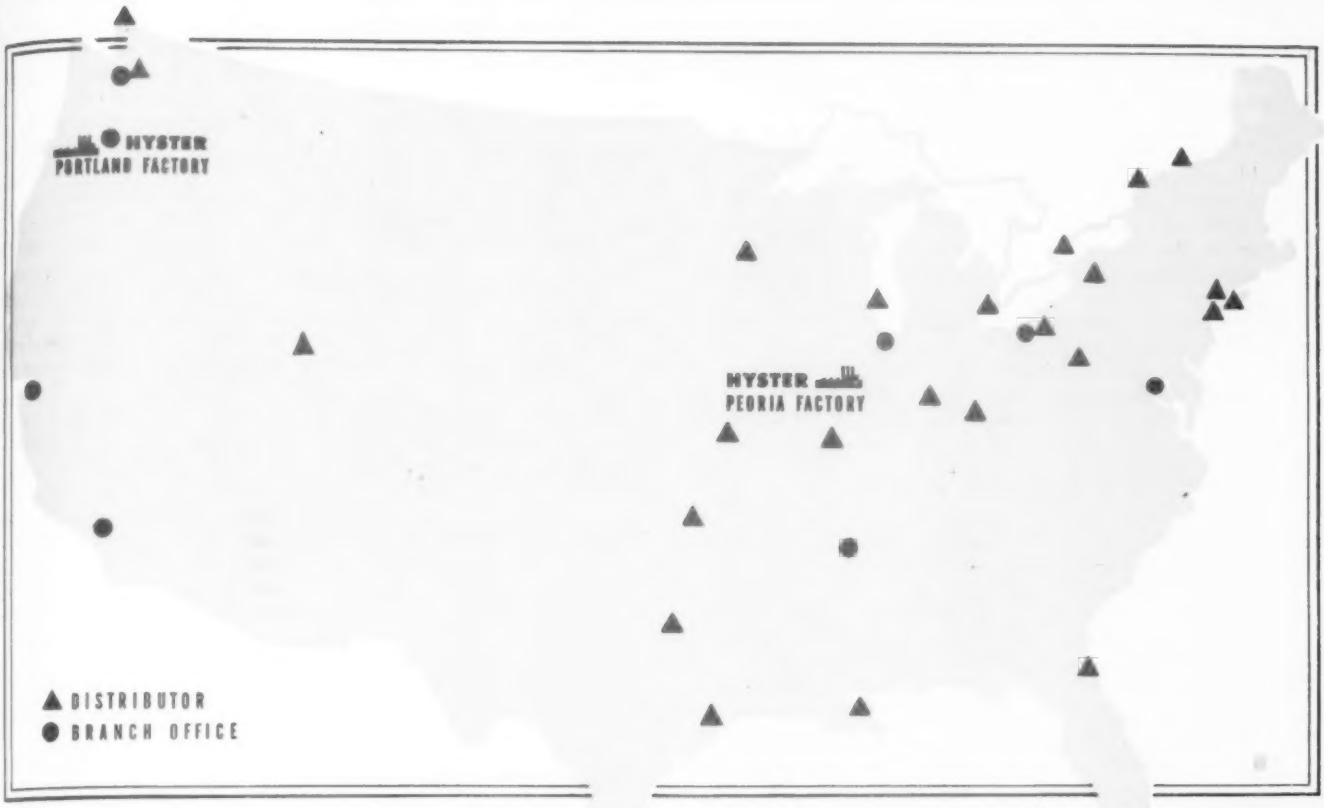

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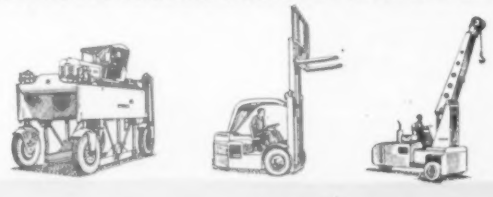

(*Continued from page 252*)

face. Such a condition results in unorthodox fractures. This is shown in Fig. 1 where the white central area is the cracked portion. The surface appearance is the same as the white iron fracture and since there is no connection to the surface no discoloration could occur from oxidation. The surrounding black portion is the sound part fractured after graphitization. There is no structural difference in the metal of the two areas.

There is also some tendency, under certain conditions very strong, for the metal to nucleate itself in localized areas when cooling in the mold. Here again the mechanism is not clear but may be something akin to that occurring in the quenching referred to previously.

Thinking of various materials either as graphitizers or stabilizers is not sufficient. The materials in a given group may differ not only in degree but also in character of behavior and their behavior may vary in irons of different composition, indicating the influence of some other factors on their behavior. A few examples will make this clear.

Silicon seems to behave in a consistent manner as a graphitizer throughout the whole iron-carbon alloy range with the exception of some unusual conditions[1]. However, beside its normal graphitizing effect it also has powerful nucleating properties unless sufficient time and temperature be allowed for the proper amount of diffusion to occur. The nucleating effect of late additions is beneficial in the gray iron industry but disastrous in the malleable field.

Aluminum in the amount of 0.003 per cent has very little graphitizing value of itself in converting white iron to malleable iron, but, in certain sections of certain irons, with a short low-temperature pre-anneal heat treatment it has a pronounced effect. Naturally, it makes no difference whether the heat treatment was accomplished intentionally or unintentionally. The point is that under certain conditions a trace of aluminum can be a powerful aid to graphitization, while under other conditions it would be of no appreciable importance.

Again in the malleable field, a trace of boron of the order of 0.002 to 0.003 per cent behaves as a graphitizer, but with slightly larger amounts it reverses and becomes a powerful stabilizer. Its stabilizing properties seem to be directed against decomposition of the eutectic carbide and it has very little, if any, stabilizing effect on the eutectoid carbide.

An interesting example is the comparison of two stabilizers, tellurium and boron in amounts of 0.05 per cent, in two different irons, one a malleable mixture of about 0.90 per cent silicon and the other an approximately eutectic gray iron of about 3.00 per cent Si. In the case of the gray iron the tellurium will have produced white iron at the surface and the remainder will be practically all ferrite. The very fact of its stabilizing properties in this case resulted in the formation, in the interior, of a very fine graphite which in turn became a graphitizer with respect to the eutectoid carbide and resulted in a ferrite instead of a pearlite structure. The specimen with boron produces no chill at the surface and the matrix is largely pearlite. Now let us consider the malleable specimens after the malleabliz-ing process. The tellurium specimen contains no massive carbide but is largely, if not entirely, pearlitic. The boron-treated specimen retains considerable of the massive carbide in a ferrite matrix. In view of the results obtained in the four specimens it is apparent that simply classifying materials as graphitizers and stabilizers is entirely inadequate.

Another interesting example is the combination of chromium with a trace of tellurium. A bar 1¼ x 1¼ x 6-in. cast from an approximately eutectic gray iron with 3.00 per cent Si, melted in a small induction furnace, will carry 2.00 per cent Cr without any massive carbides being present. Leaving the chromium out and adding 0.05 per cent Te produces some massive carbide at the surface (faster cooling zones). But, if 1.00 per cent Cr is used with just a trace of tellurium considerable massive carbide will occur, scattered at random throughout the section. One such mixture produced the interesting specimen shown in Fig. 5. The general fracture is a fairly dark gray with a bright white "chill" in the center.

For simplicity let us consider first an iron of eutectic composition and of approximately 3.00 per cent Si. In practice this melt would not be entirely homogeneous because of insufficient time for complete diffusion, and numerous tiny areas of hypereutectic composition would be present to act as inoculants as solidification temperature is approached. The extent to which this condition exists depends on temperature, time and environment. This same lack of homogeneity would occur to some extent even in decidedly hypoeutectic irons and to an even greater degree in hypereutectic irons. However, for simplicity it will be assumed that diffusion has occurred to the extent of a completely homogeneous material.

Starting with the melt appreciably above the eutectic temperature, if any disassociation is present it is very small and of no particular importance at this point, but its tendency to increase would probably occur as the temperature dropped, so that it may possibly inoculate itself to some extent just prior to solidification. Even if this does not occur, solid eutectic carbide at this temperature (start of solidification) and environment, is decidedly unstable and its decomposition will inoculate the remaining liquid.

Solidification starts at many centers with the precipitation of solid eutectic. At this point several things take place simultaneously and, with certain rates of cooling, at high velocity.

The final structure of the specimen will depend on its thermal treatment, principally rate of cooling down to well below A_1.

Here it must be remembered that the conditions are different within any given

(*Continued on page 256*)

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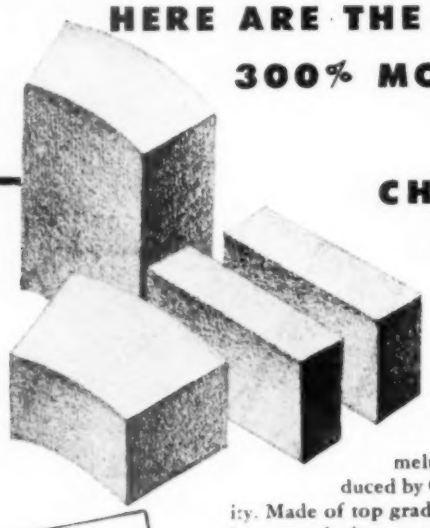

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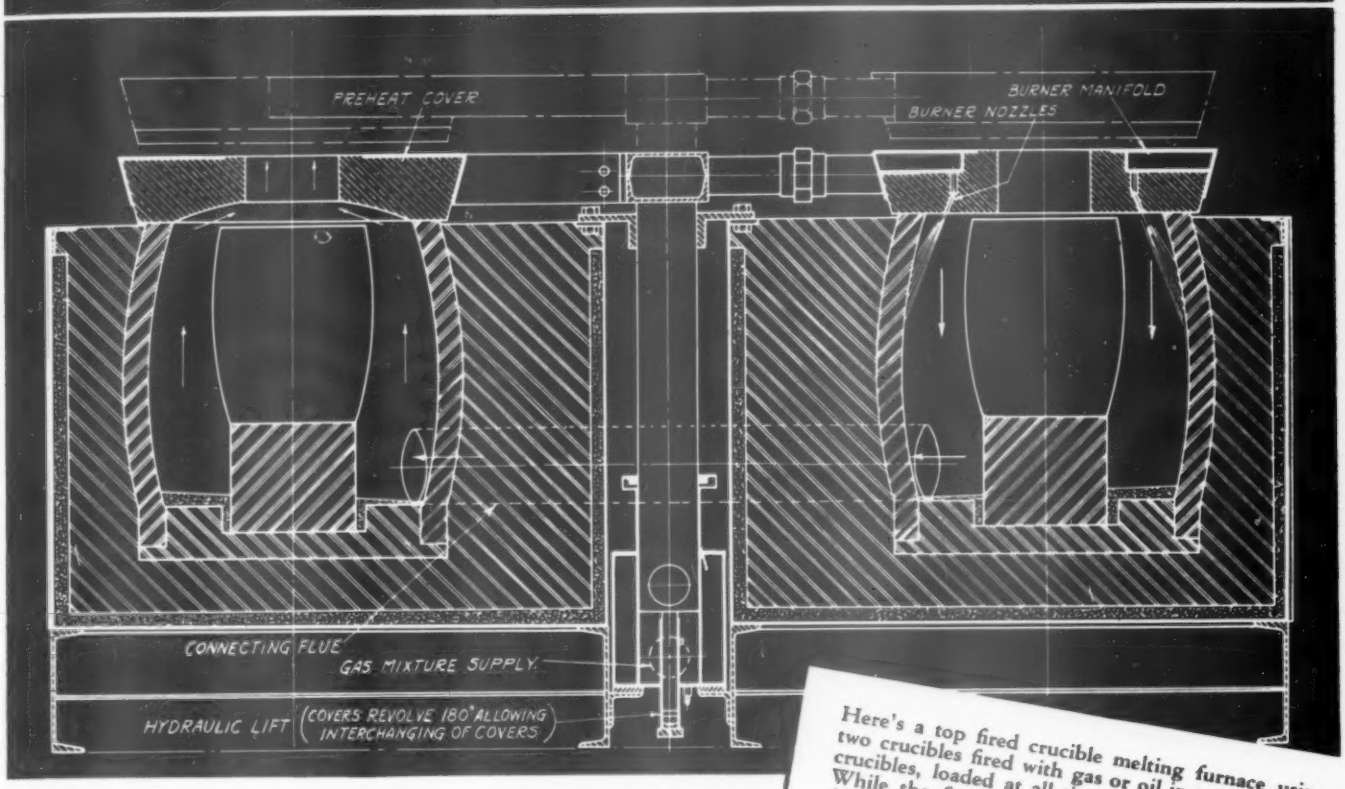

Here's a top fired crucible melting furnace using two crucibles fired with gas or oil in tandem. Two crucibles, loaded at all times, are fired alternately. While the first crucible is heated, the flue gases from it preheat the second crucible. While metal from the first crucible is being poured, a third crucible replaces the removed crucible to receive cold metal. The covers, lifted hydraulically, are interchanged by swinging them 180° permitting the preheated crucible to be direct fired while the cold metal is being preheated in the newly placed crucible. The advantages are so outstanding that no one can afford to use the older type. Section shown here has the stationary type crucibles . . . tilting types are also available.

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(*Continued from page* 254)

specimen. The metal must travel farther to fill some parts of the mold than others. The farther it travels the cooler the metal arriving in this section, while in areas of shortest travel the mold has been heated to some extent by the other metal passing over it. The smaller the gate the greater this differential. Another difference within a given specimen is that corners, edges and surfaces cool much faster through the graphitization range than does the interior. These faster cooling portions are also exposed to a more complicated thermal journey in cooling as they experience a more or less severe chilling action as they are formed and this is followed by more or less of a reheat from the interior.

In order to proceed with the example it is necessary to ignore the complications and consider only the rate of cooling.

Solidification has just started and many minute particles of solid eutectic are present. They are very unstable under the circumstances prevailing and decompose at high velocity. This start of decomposition inoculates the remaining liquid, the carbide of which is sufficiently unstable at this temperature that the graphitizing influence of the free carbon nuclei can cause its rapid decomposition. As the carbide from the liquid decomposes the carbon precipitates on the existing carbon particle. If nothing else occurred the graphite would be in the form of spheroids, but other things are happening. The instant some carbon is removed from the liquid eutectic austenite is formed and, being below its solidification temperature, it solidifies immediately. Additional eutectic is also solidifying. The result is the growth of the carbon particle is obstructed in all sorts of irregular patterns by the formation of austenite dendrites simultaneously with graphitization and the solidification of additional eutectic which eventually blocks it from further liquid contact and stops its growth. Therefore, the resulting carbon particles are not spheroids but all sorts of warped plates, sometimes connected, sometimes radiating from common centers. When sectioned for microscopic examination they appear as the familiar flakes, whorls, etc.

Flakes Can Grow Large

If the cooling rate is relatively slow at this point the flakes can grow large. If the cooling is faster they are pinched off sooner and are smaller. If still faster more and more of the eutectic solidifies as such and decomposes in the solid state, resulting in the very fine type D graphite and, of course, if still faster the result is less and less carbide decomposition. If fast enough the result would be a white iron of solid eutectic composition.

After the eutectic carbide has decomposed, the austenite matrix remains stable until the temperature drops further. When the temperature falls below A_1, the austenite transforms to pearlite. Whether the pearlite persists or decomposes to ferrite and carbon depends on the rate of cooling from this temperature and the graphite formation present. With larger carbon particles more widely spaced and less reactive the pearlite is more persistent. Conversely, the finer the carbon particles, the closer together and more reactive, the greater the decomposition of the pearlite.

In general, the faster the cooling the finer the graphite in flake form (graphitization from the liquid). Still faster cooling results in less graphitization from the liquid and more from the solid, giving a still finer or type D graphite. Still faster cooling results in undecomposed eutectic.

The whole range is present in an ordinary test wedge ranging from the solid eutectic at the chilled tip, through the zone of type D graphite with ferrite adjacent to it, to the coarser flake graphite in a pearlite and ferrite matrix at the heavy end. (Fig. 6).

In soft irons, heavy sections will cool slow enough below A_1 to allow the pearlite to decompose, resulting in a structure of large flake graphite in a ferrite matrix, (Fig. 4).

Figure 3 shows the effect of cooling rate two specimens of the same size, ½-in. diameter. Specimen A was cast in ordinary molding sand and B was cast in a previously heated mold of heat insulating material.

Certain stabilizers effective in the solidification interval, such as tellurium, have the same general effect on the structure as faster cooling.

Stabilizers of the type that form complex carbides of higher stability result in structures somewhat different from those produced by just extremely fast cooling. They may produce mixtures of flake graphite and solid eutectic. Their degree of stability is such that a limited amount of graphitization could occur from the liquid phase but such that none, or very little, could occur from the solid phase.

Graphitizers effective on the carbide in the solidification interval, such as silicon, have the same general effect on the structures as slower cooling. Hypereutectic irons behave similarly except they have the advantage of inoculation from decomposition of pro-eutectic cementite. Likewise, hypoeutectic irons behave similarly except for initial solidification of primary austenite.

As the alloy deviates further from the eutectic composition on the hypo side the behavior naturally depends on whether this condition is attained by lowering of the silicon or carbon or both. If silicon is held constant and carbon reduced the result is simply more primary austenite, with the composition of the remaining eutectic remaining the same and consequently behaving the same. If the carbon is held constant and the silicon reduced the result is not only more primary austenite but also a different composition for the remaining eutectic and therefore a different degree of stability.

Graphitization in decidedly hypoeutectic irons might suffer slightly from the fact that latent heat of fusion released by the primary austenite is dissipated before the eutectic starts to graphitize.

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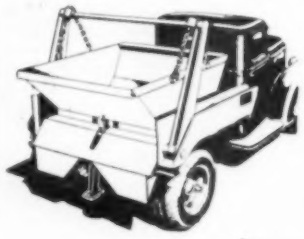

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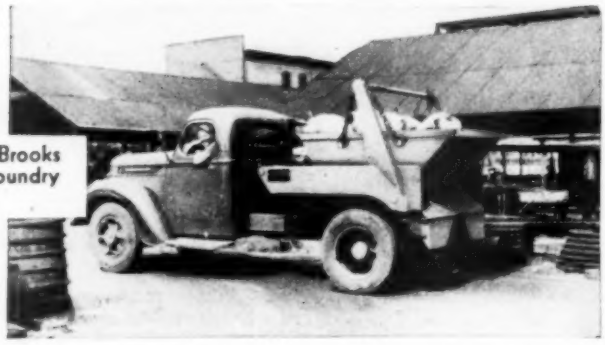

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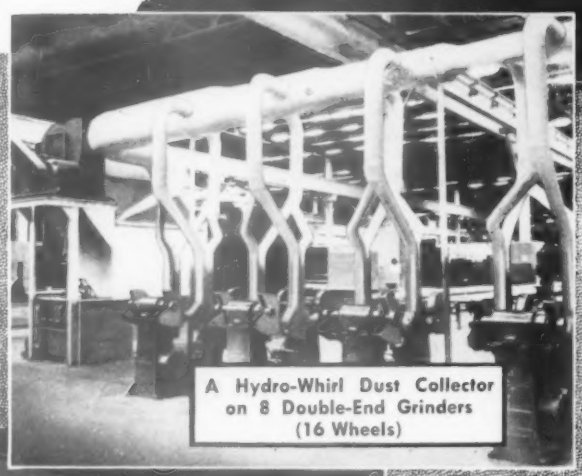

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(*Concluded from page 256;*

whereas in a eutectic composition the latent heat of fusion is released at the time most advantageous for graphitization.

As the composition moves further from the eutectic on the hypo side the tendency for the graphite to take on a dendritic pattern is greater because of the confining solid dendrites of primary austenite.

The term secondary graphitization, as used here, refers to graphitization by heat treatment; for example, the conversion of white iron to malleable iron.

This, obviously, must be carried out at a temperature appreciably below the melting point of the eutectic. Hence, it takes place in a more nearly physically uniform environment and the resulting carbon is in the form of spheroids.

Here the graphitization starts with a nucleus which decreases the stability of the carbide in adjacent austenite causing some decomposition. The freed carbon then exerts its influence to promote further decomposition of the carbide. The then impoverished austenite has its carbon replaced to saturation by eutectic carbide going into solution and diffusing to the points of lower concentration. This continues until all the eutectic has been eliminated. At this point the austenite and carbon are in equilibrium and no further graphitization occurs.

The temperature must now be lowered to just below A_1 and held for sufficient time to allow the pearlite to decompose. This takes place by a similar mechanism. The pearlite adjacent to a carbon nodule decomposes, depositing its carbon on the nodule. The carbide in the pearlite farther away must diffuse to a carbon nodule to decompose. This part of the operation requires considerable time the case of low silicon iron with relative few nodules.

Besides heat treating equipment a its operation two methods are availab to shorten the malleablizing period. O is by increasing the silicon content lower the stability of the carbide. Whe this is done some precaution must b taken to avoid primary graphitizatio This can be accomplished to some exte by prolonged holding and higher tem perature in the melting unit. Certai elements such as molybdenum[5] happe to have a more pronounced stabilizin effect in the temperature range whe primary graphitization would occur tha in the lower range. Advantage can b taken of these to retard graphitizatio where it would be undesirable witho materially interfering with carbide de composition where it is desirable. Th other method of shortening the require time is to nucleate the hard iron castin by one of the methods mentioned pre viously. In this method the stability o the carbide has not been directly affecte appreciably, if at all, but the distanc between nuclei has been greatly reduce thus materially increasing the effecti attraction of the free carbon and reducin the travel of the combined carbon to precipitation center. As this distance reduced so is the time required fo graphitization.

References

1. To be elaborated in a future paper.
2. Arthur Elsea and C. H. Lorig. "The Effe of Copper Content and Low Temperatur Pretreatment of Some White Irons on Ma leablization," *Transactions;* AFA, 1942.
3. Patent Pending.
4. Lester Crome, "Two Anomalies of Graphiti zation," THE FOUNDRY, June, 1945.
5. Alfred L. Boegehold, U. S. Patent No. 1,707,753, April 2, 1929.

FOUNDRIES OF THE FUTURE

(*Continued from page 93*)

actuating a lever, elevates a car supplied with bottom boards and flasks up into position to receive completed molds. After the molds are placed on it the car is released and is rolled to the pouring zone.

After pouring, three cars, each with its quota of molds, are carried by truck to the shakeout station, which is served by a similar conveyor system, shown in the lower half of Fig. 14. The cars with the molds to be dumped, go in on the top rails. Bottom boards and flasks are placed on the car after dumping, and the car is lowered to the lower level position. The car then rolls by gravity to a position to be picked up by the truck to be returned, three at a time, to the lower level conveyors serving the molders.

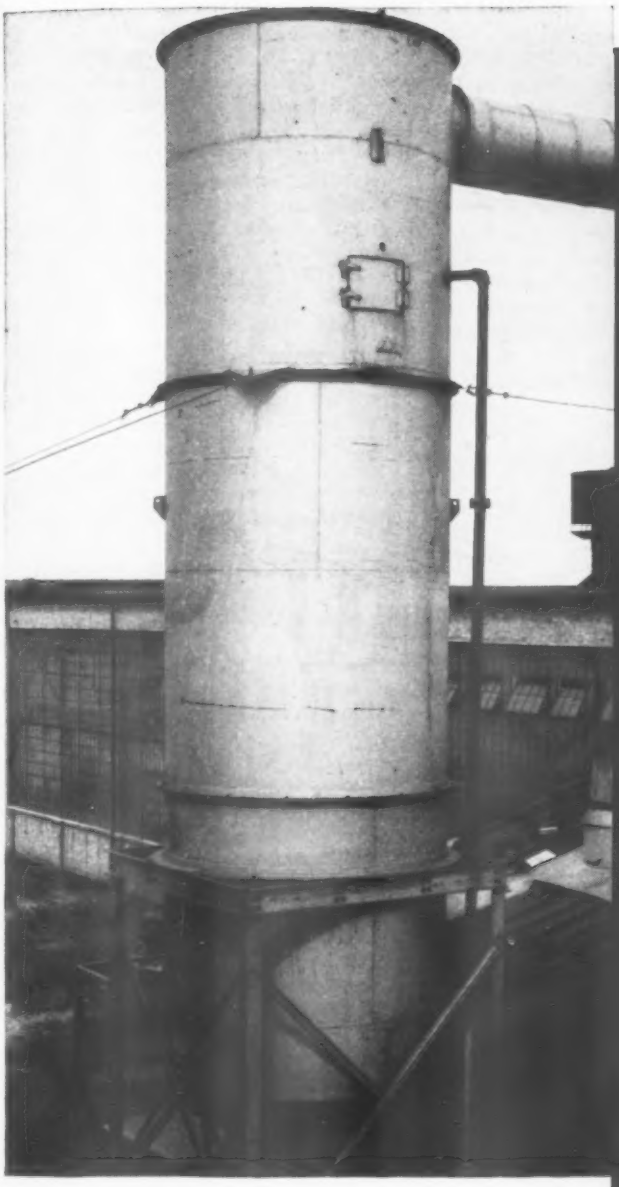
The most important feature here is the use of a fork lift electric truck instead of a roller conveyor. Incidentally, this truck can be used for other work when not in use in moving molds.

Sand storage capacity is 80 tons, an the system is so designed that san can be drawn off at the bottom of th storage bin, conditioned and returne to the top of the bin without sendin it to the molders' hoppers. This featur permits faster correction of sand specifi cations. A sand control laboratory fo testing moisture, strength and perme ability is located on a catwalk so tha sand can be tested after all conditionin of sand is completed.

A sixth floor foundry, shown in Fig 16, illustrates how it is possible to in clude a large amount of equipment be tween the floor and the ceiling, an between the limited space of four walls Sixteen molders are served by th system. The horshoe-shaped roller con veyors are necessary because the width of the room is only 50 ft. For adequat storage when the system was first oper ated, molds were stacked two high, al lowing for storage of 28 molds on each pouring side and 68 molds in each con veyor unit. Today, however, with the use of a weighting arrangement, the double stacking of molds has been dis continued.

The new method of weighting is simple

(*Continued on page 260*)



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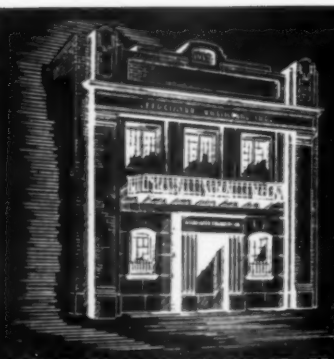

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(*Continued from page 258*)

yet effective. A pipe stand is set at one end of the conveyor. Hinged to this is a length of 4-in. pipe running to the end of the conveyor. From this pipe are suspended the ten weights. Weighting the molds and removing the weights from the molds is accomplished by the use of electrically operated pulleys.

The shakeout grate serves two loops—permitting quick shakeout after pouring and return of each molder's flask with little handling. Running alongside the shakeout stations is a casting conveyor which takes the castings to a chute at the end of the building for delivery to the cleaning room.

The cost of this system was $60,000.

A good idea of the amount of equipment in this foundry and the excellent job of engineering which has been done, may be obtained from Fig. 19. The space where the molding machine is located is 5½ ft wide. Movement of the molders in placing molds on the conveyor is minimized. Three feet separate each roller conveyor.

A view of the general foundry floor before mechanization is shown in Fig. 17. The same area after mechanization is shown in Fig. 18, but this picture was taken before the weight shifting arrangement was installed. Figs. 20 and 21 illustrate the "before and after" molding operation. Similar "before and after" views of the metal handling are shown in Figs. 24 and 25. Note that three men formerly were required to do the work now accomplished by two men with the aid of a monorail and pouring devices.

Changes made in the shakeout arrangement are depicted in Figs. 22 and 23. The improved conveyor system makes this operation easier by elevating the conveyor to the height of the dumpout bench. A roller conveyor bridge is utilized to carry molds to the shakeout station. Separating the sand from the castings is accomplished by merely flipping the flask over and onto the grating. Fig. 23 shows the casting conveyor system in operation carrying castings to the floor below where they are sorted and sent to the sprue cutting machines. Incidentally, the brass castings at this foundry are cleaned in an airless blasting unit, using steel shot and steel grit. Of interest is the fact that mold production has been increased almost 100 per cent. The other mechanical aids indicate that the mechanization of this plant has not only eliminated back-breaking tasks, but has permitted the work to be done by a smaller crew.

Connecticut's first mechanized foundry is shown in Fig. 26. This is a gray iron jobbing shop making castings up to 200 lb. The system used here fits the needs of this foundry admirably. At present, 25 to 30 tons of metal are poured daily. However, with peak employment, a 50-ton capacity can be reached. Four types of metal of varying quantities are melted in one cupola each day.

This is a good example of fitting an adequate conveyor system to the work of a jobbing shop which pours several types of metal daily. Note the size of the storage area. In any foundry where different melts are poured, large storage areas are essential.

The mold conveyors are bridged by removable sections placed in position for transferring poured molds to the return or shakeout line. Because the conveyor is inclined as it approaches the shakeout station, it has been made a power conveyor at this point. The flasks are pushed off the bottom boards by the use of a pneumatic pusher, and are placed on the return conveyor by a laborer for return to the molders.

(*Concluded on page 262*)

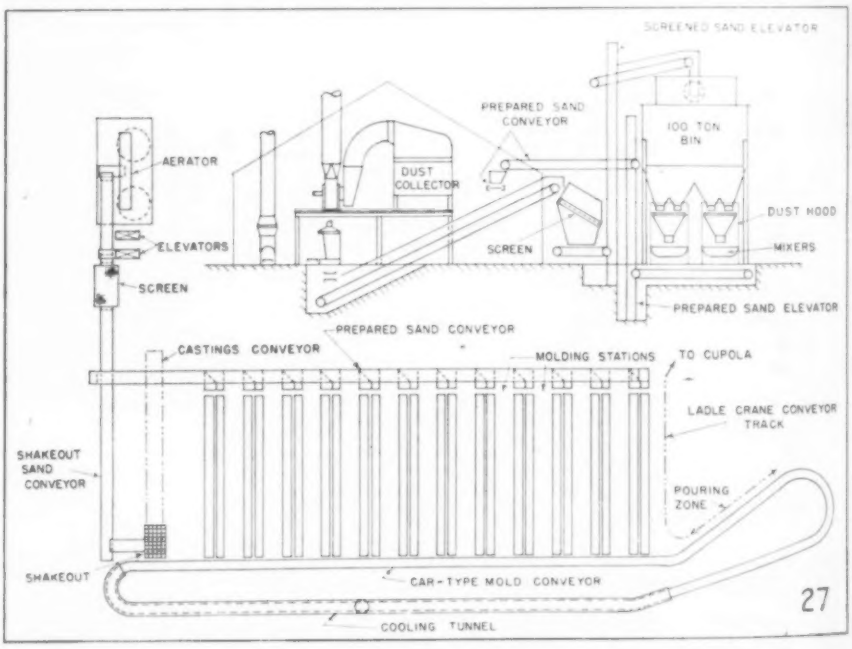

Fig. 27—Recent installation to serve 12 molding units. Combines advantages of mold storage for intermittent pouring and central pouring station served by continuous conveyor

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(*Concluded from page 260*)

The shakeout and other points of dust dispersion in the sand handling system are controlled by mechanical exhaust ventilation. Shakeout and sand systems are physically separated from the foundry proper by a brick wall partition not shown in the drawing. To remove the smoke and fumes from the foundry after pouring, five 36-in. roof fans are to be used; two of these fans have already been installed.

Fig. 27 shows Connecticut's latest installation. The system, about to be put into operation, will serve 12 molding units and combines the advantages of mold storage for intermittent pouring and a central location for pouring which is served by a continuous power conveyor system. Different melts may be poured at this foundry. It is expected that the complete system will cost approximately $70,000.

In all of these foundries, the advantages of mechanization are utilized to the fullest by the adoption of incentive pay. Rates have been established on the basis of time studies made *before mechanization* and then, by subtracting the time required for tasks mechanization eliminates, a piece work rate is developed.

In all of these systems, the operators had "bugs" appear which seemed able to frustrate the plans made on paper. These difficulties always make their appearance with changes, but if the systems are well engineered and are designed to do a specific job, the operators and their engineers will have no trouble. The time the "bugs" assume the proportions of uncalculated risks is when the systems are improperly engineered.

Gives Advantages of Method

In conclusion it should be emphasized that while this paper deals essentially with sand and mold handling, complete mechanization doesn't end here. Labor-saving devices can be used in all other phases of a foundry's activities. However, in connection with sand and mold handling systems, the following points should be stressed:

The advantages of properly engineered systems are many:

1. The molder makes molds. He no longer has to be a combination molder and laborer while getting a molder's rate of pay.

He doesn't pour and shake out castings, and in most systems he neither shovels nor cuts the sand.

Molder's fatigue is reduced to a minimum. He doesn't carry molds to the pouring floor.

The molder likes mechanization because it gives him an opportunity to produce molds on a piece work basis, and fair incentives stimulate production.

During wartime production, many foundries found they had sufficient molding capacity but insufficient manpower to produce in excess of normal capacity. Mechanization and the incentive system solved the problem. Other foundries with sufficient manpower to operate at normal capacity found that demands for greater production could not be met without the installation of mechanical material handling equipment.

2. Pouring can be centralized and hand pouring practically eliminated in both the continuous and intermittent type foundry. And with the elimination of hand pouring goes a task long known for its back-breaking characteristics. Pouring can be accomplished by regular pouring crews operating overhead carriers which can very easily be arranged for the height of the molds to be poured.

3. Shakeout and core knockout can be centralized, making the transportation to the cleaning room a relatively simple operation for either trucks, cranes or conveyors. These operations are responsible for considerable dust dispersion, and with centralized control by mechanical exhaust ventilation becomes relatively simple. For some types of castings, gates and sprues can be removed easily at this point, thus combining this operation with that of shaking out.

4. The sand is more thoroughly and properly treated and absolute sand control can be maintained, assuring uniform results. New sand requirements can be kept to a minimum, and in most cases the use of special facing sands can be eliminated.

5. With any system of mechanization, a program of preventive maintenance is necessary. Designers and builders of the system will lay out this work; they will also instruct a man how to shoulder the responsibilities of carrying out the oiling and greasing program. A spare parts program should be developed so that in case of breakdown shutdown time in minimized. As for oiling and greasing, have the man in charge of this work record his activities.

6. With mechanization, supervision has to be improved, and this improvement will come automatically with the better planning that is necessary to make the system pay for itself.

7. Sand storage is very important. Don't try to cut corners here.

8. With mechanization, a good housekeeping program can be developed and actually adhered to. This is an item of considerable importance, and anything that can be done to simplify cleanup certainly is worthwhile.

Opinions expressed in this article are entirely those of the author, and the Industrial Hygiene Division of the United States Public Health Service does not necessarily endorse these views.

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Foundrymen wishing to obtain information on surplus foundry equipment available for sale by the Reconstruction Finance Corp. should get in touch with the office of that agency in the particular district. A list of the various RFC district offices follows, with the name of the individual handling foundry equipment sales being shown wherever available:

ATLANTA region: 699 Ponce de Leon Ave., Atlanta, Ga. Foundry equipment, F. W. Hausman; telephone: Cypress 1961, Ext. 1. All of Georgia.

BIRMINGHAM: Comer Bldg., Birmingham, Ala. All of Alabama.

BOSTON region: 10 Post Office Square, Boston, Mass. Foundry equipment, E. D. Eagan; telephone: Liberty 8000, Ext. 60. All of Massachusetts, Maine, New Hampshire, Vermont, Rhode Island and Connecticut (except Fairfield County).

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CHICAGO region: 208 South La Salle St., Chicago, Ill. Foundry equipment, Harry R. Whirl, telephone: State 0800, Ext. 357. Fifty-eight counties of Illinois north of, and including Hancock, Schuyler, Cass, Sangamon, Christian, Shelby, Cumberland, and Clark counties; 68 counties in Indiana, north of Sullivan, Greene, Lawrence, Jackson, Scott, Jefferson and Switzerland counties; all counties of Wisconsin, except those west of Monroe, Jackson, and Clark counties and north of Clark, Marathon, Langlade, Oconto and Marinette counties; and all of Iowa.

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(Concluded on page 266)

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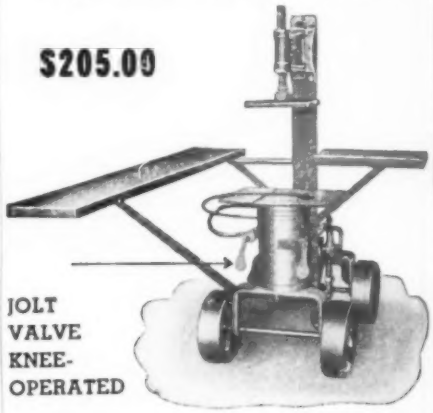

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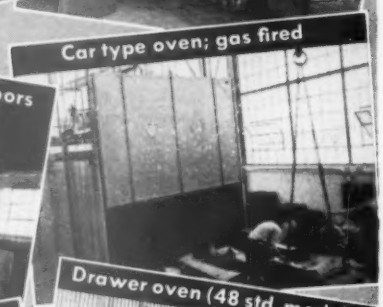
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DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

A cleaning operation required frequent lifting of a basket of parts in and out of the tank.

A Reading Electric Hoist with unit construction provided a special solution without special engineering cost. The built-in trolley permitted easy movement. The rigid arm push button gives control of both motions. The D.C. motor and controller were also standard mechanisms.

The Reading Electric Hoist unit construction plan gives you 144 combinations of standard mechanisms to give special solutions to your materials handling problems.

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READING CHAIN & BLOCK CORPORATION
2108 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

(*Concluded from page 264*)

JACKSONVILLE: Western Union Bldg., Jacksonville, Fla. All of Florida.

KANSAS CITY region: Federal Reserve Bank Bldg., Kansas City, Mo. All of Kansas and the following counties in Missouri: Andrew, Atchison, Barton, Bates, Buchanan, Cass, Clay, Clinton, De Kalb, Gentry, Holt, Jackson, Jasper, McDonald, Newton, Nodaway, Platte, Vernon and Worth.

LITTLE ROCK: Pyramid Bldg., Little Rock, Ark. All of Arkansas

LOS ANGELES region: 523 West Sixth St., Los Angeles, Calif. Foundry equipment, Linwood, McKean, Imperial, Inyo, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara and Ventura counties in southern California; and all of Arizona except Cochise, Graham, Greenlee, Pima and Santa Cruz counties in southeastern part of the state.

LOUISVILLE: Lincoln Bank Bldg., 421 West Market St., Louisville, Ky. Foundry equipment: R. W. Owen. Sixty-four counties in Kentucky west of, and including Gallatin, Owen, Franklin, Anderson, Mercer, Boyle, Casey, Russell and Wayne counties; and Clark, Crawford, Floyd, Harrison, Jackson, Jefferson, Lawrence, Orange, Perry, Scott, Switzerland and Washington counties in southern Indiana.

MINNEAPOLIS region: 438 McKnight Bldg., Minneapolis, Minn. Foundry equipment: George Gillette. All of Minnesota, North Dakota, South Dakota, the Upper Peninsula of Michigan, and 26 counties in northern Wisconsin, bounded on the east or south by, but not including the counties of Vernon, Monroe, Jackson, Clark, Marathon, Langlade, Oconto and Marinette.

NASHVILLE: Nashville Trust Co. Bldg., Union St., Nashville, Tenn. All of Tennessee.

NEW ORLEANS region: Richards Bldg., 837 Gravier St., New Orleans, La. All of Louisiana and Mississippi. Foundry equipment, G. E. Odom; telephone, Canal 2701.

NEW YORK region: 70 Pine St., New York, N. Y. All of New York state; Fairfield county in Connecticut; and the 12 counties in New Jersey north of Mercer and Ocean counties.

OKLAHOMA CITY: Cotton Exchange Bldg., Oklahoma City, Okla. all of Oklahoma except Atoka, Bryan, Choctaw, Coal, Johnston, McCurtain, Marshall and Pushmataha counties in southeastern part.

OMAHA region: 1208 Woodmen of the World Bldg., Omaha, Nebr. All of Nebraska and Wyoming. Foundry equipment, Harry W. Neal, telephone: Jackson 8200, Ext. 9.

PHILADELPHIA region: 1528 Walnut St., Philadelphia, Pa. Foundry equipment; J. P. Quinlan; telephone: Kingsley 1500. Forty-eight counties in eastern Pennsylvania, bounded on the west by, and including McKean, Elk, Clearfield, Cambria and Bedford counties; all of Delaware; and nine New Jersey counties bounded on the north by, and including Mercer and Ocean counties.

PORTLAND region: Pittock Block, Portland, Oreg. All of Oregon, except Klamath and Lake counties; and Clark, Klickitat, Skamania, Cowlitz and Wahkiakum counties in Washington. Foundry equipment, W. J. Roork; telephone, Atwater 6401.

RICHMOND region: Richmond Trust Bldg., Seventh and Main Sts., Richmond, Va. All of Virginia, Maryland, District of Columbia and all of West Virginia except Brooke, Hancock, Marshall, Ohio, Tyler and Wetzel counties.

ST. LOUIS region: St. Charles Bldg., 505 North Seventh St., St. Louis, Mo. Foundry equipment, L. C. Perry or E. B. Langenberg. All of Missouri, except Andrew, Atchison, Barton, Bates, Buchanan, Cass, Clay, Clinton, De Kalb, Gentry, Holt, Jackson, Jasper, McDonald, Newton, Nodaway, Platte, Vernon and Worth counties; 44 counties in Illinois south of, but not including Hancock, Schuyler, Cass, Sangamon, Christian, Shelby, Cumberland and Clark Counties; and Sullivan, Greene, Knox, Davies, Martin, Gibson, Pike, Dubois, Posey, Vanderburgh, Warrick and Spencer counties in Indiana.

SALT LAKE CITY region: 504 Dooly Bldg., Salt Lake City, Utah. Foundry equipment, G. C. Croft; Telephone: 5-7503, Ext. 32. All of Utah, 34 counties in Idaho south of Idaho county; and Clark, Elko, Lincoln and White Pine counties in eastern Nevada.

SAN ANTONIO region: Third Floor Transit Tower, San Antonio, Tex. Foundry equipment: Larry S. O'Mealy; telephone: C-1461. The 52 counties in southern Texas, bounded on the north or east by, and including Presidio, Brewster, Terrell, Valverde, Edwards, Kimble, Mason, Llano, Blanco, Travis, Caldwell, Gonzales, Dewitt, Goliad, Bee, San Patricio and Aransas counties.

SAN FRANCISCO region: 256 Montgomery St., San Francisco, Calif. Foundry equipment: J. W. Bryson and E. D. Locke, telephone: Exbrook 6206. All of California, except Imperial, Inyo, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara and Ventura counties in southern part; all of Nevada, except Clark, Elko, Lincoln and White Pine counties in eastern part; and Klamath and Lake counties in southern Oregon.

SEATTLE region: 340 Central Bldg., Seattle, 4, Wash. Foundry equipment, J. W. Markey, telephone: Main 1080 Ext. 25. Sixteen counties of Washington west of Okanogan, Chelon, Grant and Yakima and north of Wahkiakum, Cowlitz and Skamania counties.

SPOKANE: 500 Welch Bldg., Spokane, Wash. Foundry equipment, C. E. Newton, telephone: Riverside 8051 Ext. 37. Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman and Yakima counties in the eastern part of Washington; and 10 counties of northern Idaho bounded on the south by, and including Idaho county.

Start Work on Large Brazilian Foundry

Plans for the foundry of the larg Brazilian National Steel project at Volt. Redonda, Brazil, have been accepted by the company, and construction on it has commenced, according to Roy I Jones, head of the Industrial Engineering Division of Giffels & Vallet Inc., L. Rossetti, associated engineers and architects, Detroit, who designed the complete foundry project.

"This foundry is of particular interest from the standpoint of foundrymen for a number of reasons," Mr. Jones stated.

"The foundry, which will cost approximately $1,850,000, will produce ingot molds and stools, iron grain and chilled rolls, steel rolls, miscellaneous iron, steel and nonferrous castings. It will be one of the most modern of its type in this hemisphere.

"The foundry is a dual purpose facility. Half of the space is devoted to highly mechanized production system for the regular supply of ingot molds and stools. The remaining half is primarily for production of castings to maintain the mill equipment, and has facilities and equipment capable of producing any casting in the entire steel mill.

"The foundry is designed so that ingot molds may be poured with hot blast furnace metal direct from the open hearth mixers. Its equipment includes a cupola, air furnace, electric furnace, monophase furnace, nonferrous metal furnace, annealing furnaces, pit type ingot mold ovens, a completely mechanized sand conditioning and distribution system, casting and cleaning equipment, roll turning lathes, and ingot mold milling equipment."